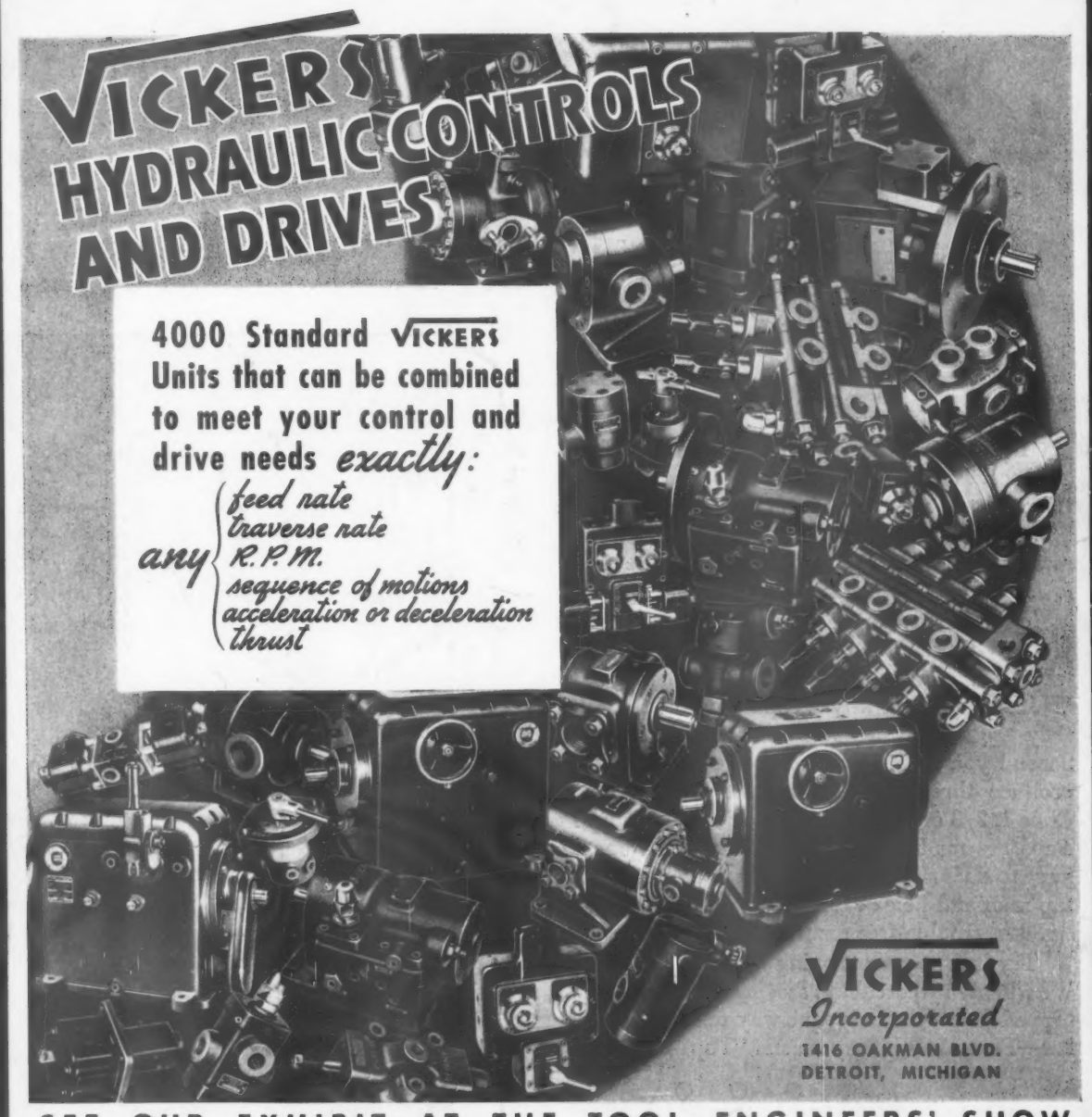
The TOOL ENGINEER



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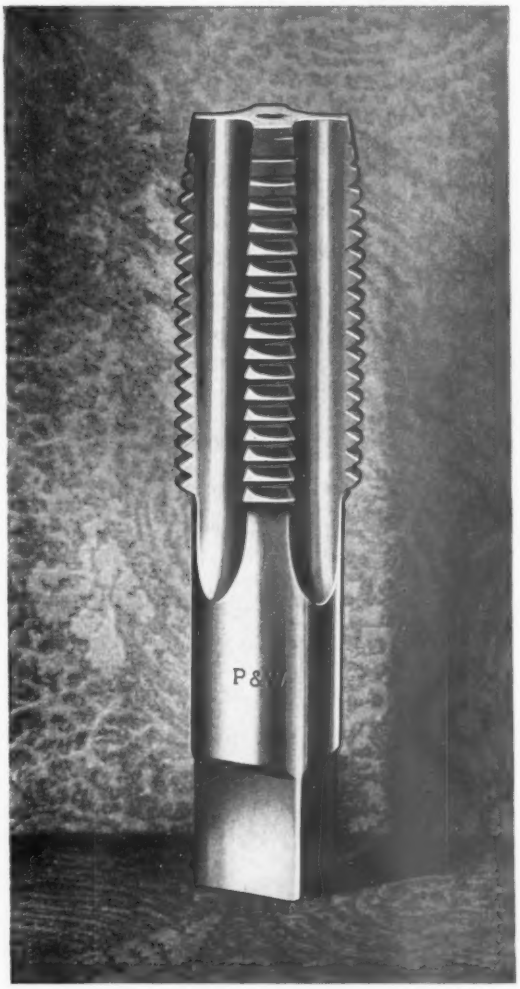

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Vol. VII FEBRUARY, 1939 No. 10

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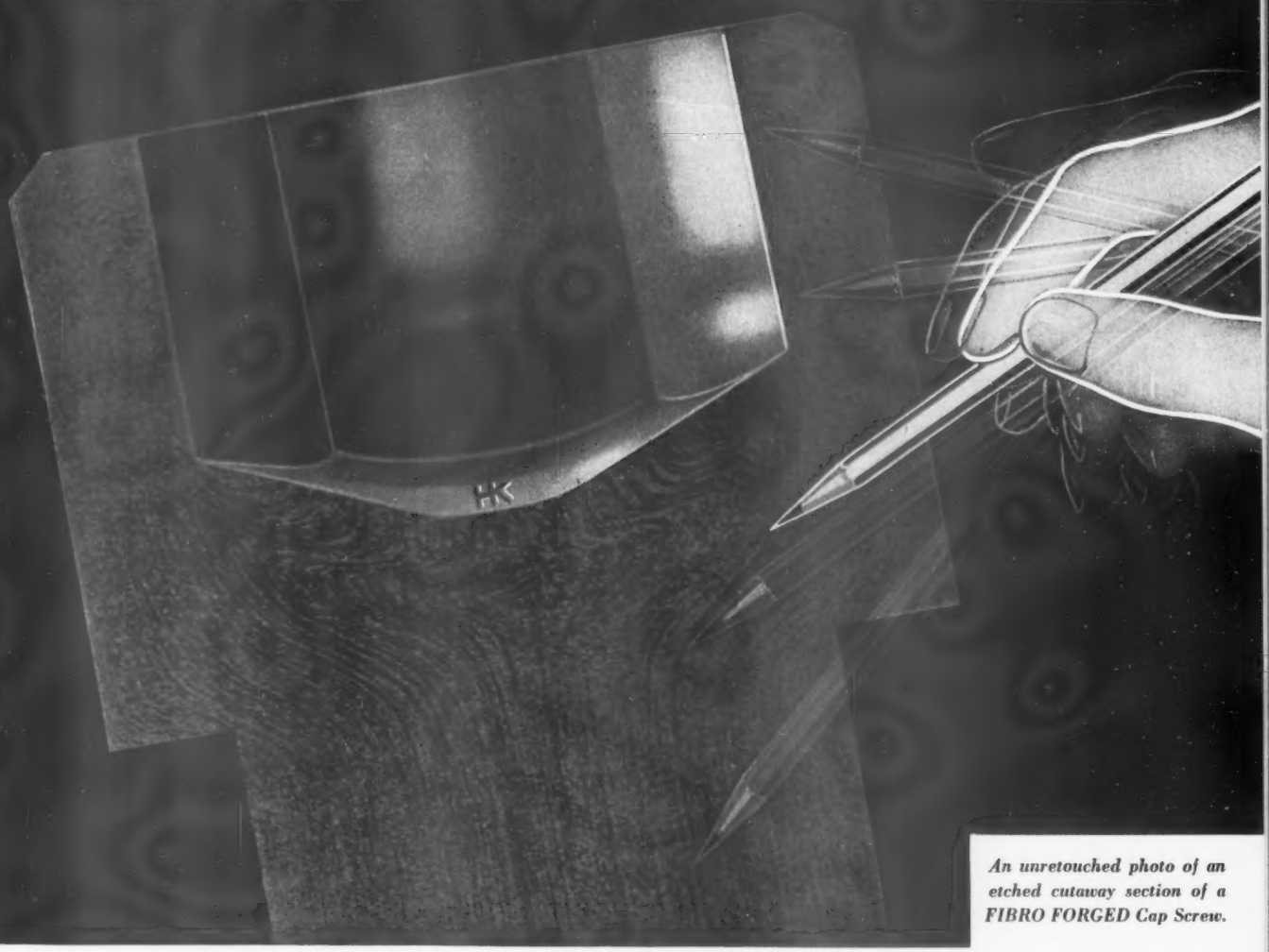

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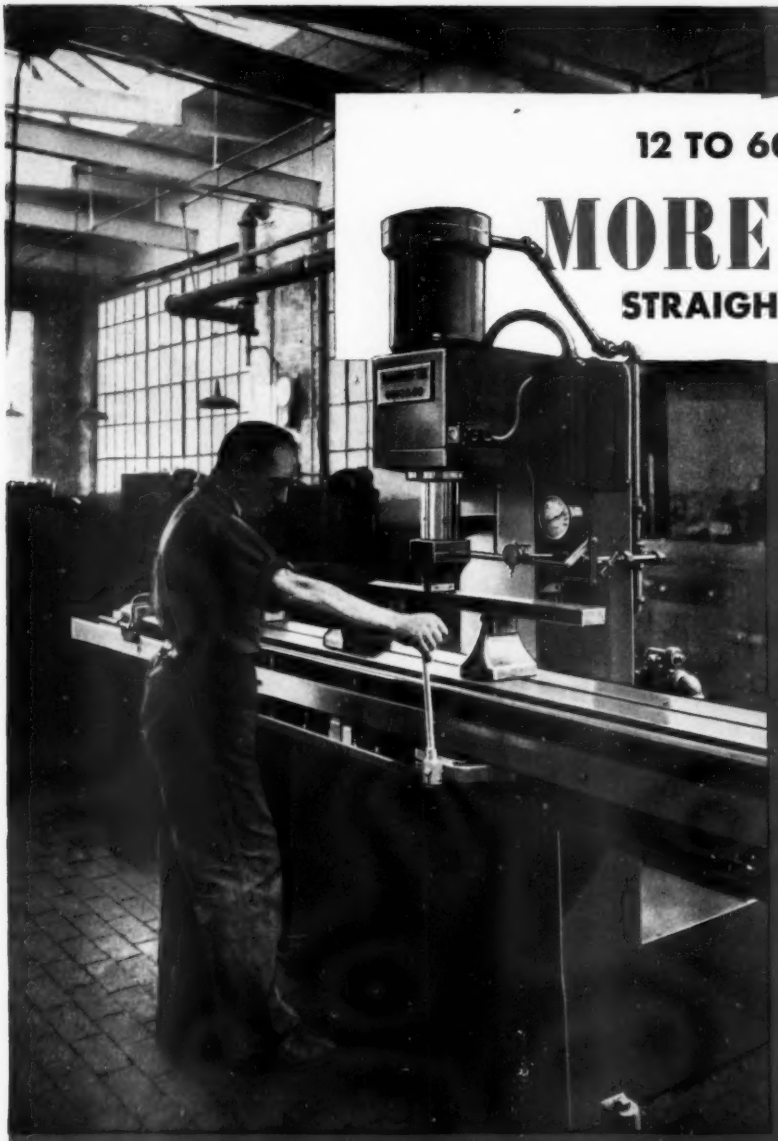

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STANDARDIZATION *and Progress*

AN EDITORIAL

BY

A. E. RYLANDER

AT this time, with America definitely entered in the armament race, one senses rather than hears the opening salvo of the guns. For surely, billions of dollars expended by various nations for the equipment of war is not altogether an idle gesture; we may look for provocation—from somewhere. And then!

However, this writing is but indirectly concerned with the tools of destruction; the theme is constructive if provocative since armament is a challenge to industry and engineering, especially to Tool Engineers. For the war of tomorrow will be fought but incidentally on the battlefields and high seas; the real theatres of operations will be the farms that produce food and the shops that produce the agencies of destruction. And that brings up the matter of standardization. Thousands of shops, efficiently tooled, will produce guns and parts of guns, each as alike as micro-gages permit, will produce shells and cartridge cases as alike as newly minted dimes, each a perfect fit in any gun of similar calibre, each fuse so precisely machined that the explosion can be timed to the split second, gaged (almost) to the yard. And remotely scattered platoons and regiments will drill and maneuver to standardized commands, even as dancers in a thousand ball rooms move and gyrate to the rhythm of standardized music.

Oddly enough, war and depression—threats to our existence—seem to be among the greatest inciters to invention and creative art. And, destructive as war is, as outrageous and on the whole unnecessary, one thing can be said in its favor, that the invention which it engenders later reverts to the benefit of mankind. As the conquest of disease, the restoring of the maimed, the building of roads, advancement in chemistry and metallurgy, improvements in manufacture. And war is a potent factor in standardization. Consider merely the standardization of uniforms and weapons during the ages. Yet, this is the Super-Age of Standardization, although a diversified, versatile age, an age of Transition and of Achievement. It's just that we are being patterned to a norm, even our vocations have become standardized, and in foreign lands as here, minorities seek to shape the destinies of the majority.

Music has long been standardized, so that an opera written in Italy can be sung anywhere, drawings are standardized, so that a machine designed in Hartford can be built wherever there are machine tools and the men to operate them; and even the fuels and lubricants for our engines are standardized, and so on ad infinitum. Yet, there is infinite room for originality; the eight notes of the scale combine into lilting aria or sonorous chorus, the three primary colors into endless range of shade, but a tithe of our vocabularies are potential of masterpieces of literature. Apparently, then, standardization is not a barrier to progress.

Standardization is utterly essential to our modern, complex civilization. The automobile that is built in Detroit must be serviced anywhere on the globe, there must be spare parts to replace any unit that fails in operation. Yet, automobiles are being made more beautiful, more convenient and efficient, far safer; there is progressive development, as there is evolutionary progress in all of the arts of manufacture, as there is evolution even in product of the soil and in the breeding of cattle. Standardization with evolutionary progress. Sounds fantastic, paradoxical, doesn't it? Yet, in this age, we couldn't have the one without the other, for, there must be some basic norm, like the precision gage blocks, to serve as a comparator. "This is our ideal of perfection today, we will use it as a basis until a new norm is proven."

The danger of standardization lies in that we may become satisfied, that we may be content to rest on our laurels. It has happened before that humans have become content and, like the Chinese who, the progenitors of many of our modern arts, remained in a state of suspended civilization while the rest of the world marched on; now, war acts like an elixir for rejuvenation. The potential menace of war, then, which this frenzy of armament presages, may be regarded as a blessing of sorts; it will spur invention, will tax the ingenuity of Tool Engineers and—it may be averted. But that will tax the ingenuity of the world's diplomats.

THESE ARE FACTS

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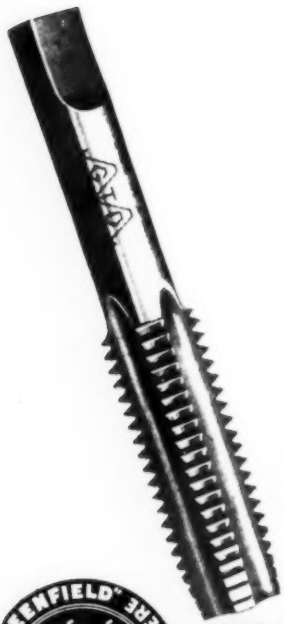

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Lieutenant Colonel Johnson Outlines

INDUSTRY'S PART IN U. S. PREPAREDNESS

Reported by
H. O. OLSON *
Rockford Chapter, Secretary

GENTLEMEN, it always gives me pleasure to speak to Tool Engineers as they are in my opinion, the backbone of the industrial support of the Army," said Lieutenant Colonel A. H. Johnson, Executive for the Chicago Ordnance District, as he spoke to 635 Tool Engineers and members of the Reserve Officers organization of the Rockford District at the technical session.

He outlined the lessons that had been learned during the World War, and illustrated many instances of confusion as the result of unpreparedness, and the ensuing inability of Industry to support the Army in its huge program. He stated that conditions were to blame rather than any specific group of our citizenry. The important thing at this time was to learn the lesson, and to avoid for the future any such lack of coordinated effort.

Colonel Johnson explained a new plan which is being initiated to develop dependable sources of supply in case of a national emergency. Educational orders are being placed with various concerns for the more necessary items required during a war period. Such concerns are provided with a complete tool and gauge set-up for the product required. By this means, a check can be made for the determination of the proper manufacturing tolerances, besides getting an understanding of the manufacturing problem as a whole.

After the completion of the preliminary educational order, the tools are stored for the future emergency needs. With the elimination of any errors that may have been discovered during the trial order, the prospects are quite promising that ordnance materials could be produced upon short notice, a condition quite at odds with that which confronted the United States of America during the World War.

Data on the machine tool capacity on a very broad scale is being sought with considerable vigor. Colonel Johnson reported that in many instances this information was difficult to obtain since industry in this matter has chosen to be very secretive, at least in certain localities. In this effort it has become necessary to inquire of the National Machine Tool Builders Association, who in turn sent out questionnaires to its members. The information returned by them was summarized in a composite report, which, though it maintained private individual information for the individual manufacturer, served to provide the information required.

When a distinct shortage of machine tool capacity was found, auxiliary sources, such as small tool shops, were investigated for additional capacity.

Lieut. Colonel Johnson displaying the new large automatic rifle soon to be manufactured for army use.

He mentioned that the large number of obsolete machines now being used in the arsenals throughout the country will be replaced at an early date if the next Congress approves the expenditure to put the arsenals on a productive basis compatible with modern demands. While he did not desire to estimate the amount of money this would entail, it was intimated to amount to several million dollars.

Epitomizing his program Colonel Johnson said: "The various organized combat units of the Army demand many varying kinds of ordnance. It is my job to determine how to build and provide it and the length of time required to deliver to a given locality assuming the normal time to carry it to destination by the means of transportation desired for the particular item."

He went on to explain that the nation was divided into fourteen districts for simplification purposes. Four contract forms cover the purchases of all ordnance materials whereas during the war hundreds of contract forms were used, many of which were illegal, as proved subsequent to the last war. This caused many and large losses to manufacturers. A board of adjustment decided the legality of claims then.

A fixed price type of contract is to be had now for material which can quickly be estimated as to cost and other features. On more complicated materials, such as anti-aircraft guns, authorization is provided to manufacture subject to price adjustment which follows, to save time. Though this may have its faults, it is better than cost plus methods of figuring which proved so uneconomical during the war of 1918.

It had been found that fairly comprehensive and accurate information on the sources of potential supply of ordnance materials could be obtained in the center of the machine tool sales which is more or less concentrated in the vicinity of Washington Boulevard, Chicago, Illinois.

By questioning tractor manufacturers about their sources of supply for carburetors, possible sources for carburetors were found for the air corps requirements.

On all jobs requiring steel, the companies from whom to purchase steel are to be specified and a priority is to be stated. This makes for an understanding or agreement which is mutually agreeable to the contract parties and to the War Department, and prevents cross hauling when the railroads are overloaded.

During the last war, drawings had to be made of countless parts entering into ordnance. Now drawings are had on all parts. The educational method of placing orders for small supplies of materials constitutes a check on the accuracy of such drawings.

It is far easier to store a reserve of guns than ammunition. Although we aim at all times to have a good supply of ammunition on hand, the fact remains that it deteriorates with time and finally becomes quite ineffective or useless. Therefore, we must be able at all times to produce ammunition quickly.

Bids are being obtained from the large rifle companies to manufacture several hundred of the new automatic rifles per day which was shown at the meeting and as illustrated in this article.

Orders are to be issued on similar basis for the manufacture of 25,000 of the 75 M.M. shells. Three companies are to tool up for production of the required number of gas masks. The recoil mechanisms for the 75 M.M. guns have always been difficult to produce in quantity on short notice. Therefore, one company is to be tooled to produce these mechanisms in sufficient quantity to meet emergency needs. All tooling used for the production on the educational orders is to be held in reserve.

(Continued on page 34)

* **From a talk given to the Rockford Chapter 12 of the American Society of Tool Engineers, Dec. 8, 1938.**

The Impermanence of
PERMANENT DIES

By E. O. WISTRAND
TOOL RESEARCH ENGINEER
MINNEAPOLIS HONEYWELL REGULATOR COMPANY

MOST likely what I am going to say here might be of very little interest to this group. Perhaps it has been assumed that here would be some discussion about dies and tools in general, and some pointers would be given regarding the best construction of dies. But here is where the disappointment might be, because I am not going to do that. I am fully aware of the fact that in the group assembled here, there are many who would be very able to correctly advise you.

There are endless and infinite varieties in tool design. No two tool makers will design even a simple die in exactly the same way. Books are available giving many typical examples of good practice in mechanical design. Therefore, it seems unnecessary to attempt a general discussion here about how dies should be made. I believe it will be of interest to deal with some of the difficulties connected with the power press tools and their successful use in industry. Of course, we are all conscious of the fact that when a new article is to be put on the market, there is the big question, what will the manufacturing cost be? We are also familiar with the part the punch press is playing in modern manufacturing, when it comes to mass production and lowering the cost of production.

Therefore, we assume the punch press has been selected to provide as many parts as practical from the cost angle, but here is where it is extremely easy to make mistakes that might prove to be very costly in the long run. It is not the first cost of "tooling up" that is so important, but the tool maintenance is the thing that sometimes plays a "dirty trick" on us. The cost of tool maintenance is affected by the following conditions:

The design of the part to be made.

Type of dies selected for the job.

Class of dies for the particular job.

Proper use of dies, to produce the parts most economically.

What kind of repairs will have to be done?

Inspection standards to maintain the highest quality with the lowest cost.

If the statements in the six items mentioned are correct, then it is evident that it will require a very close cooperation throughout the whole plant in order that the maintenance cost may be held to a minimum. I believe it will be necessary to deal with the six points just mentioned a little more in detail, to see if the statements made can be explained so that all of us will agree on them.

The first point was the design of the part to be made. What I have in mind is that when a part is to be designed and it is the intention to make that particular part with the punch press, it should be so designed, if conditions permit, that the tool maker would be able to make proper dies without having to resort to extra operations and doubtful processes which might prove very expensive in the long run. It is important to have a full understanding of all the difficulties connected with the tool and die game as far as it will apply to the proposed part.

Many difficulties and much unnecessary expense can be avoided by cooperative exchange of ideas between an experienced designer and an experienced tool and die maker, but even if such planning has been done, it might be found that after the tooling up is completed something has been overlooked, or perhaps some material did not behave just as it was calculated it should, and the result is that something else must be done; the tools must be reworked or the drawings should be changed to conform to the part.

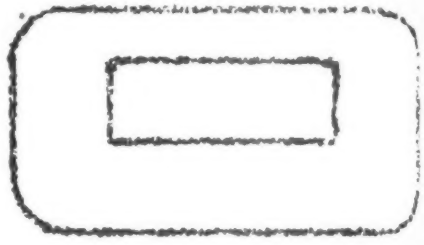
Now that might be a rather controversial point, but let me make it clear that I do not favor the idea of starting to do a job and be satisfied to let it be something else than what it really was meant to be in the first place. What I have in mind is that when trouble of the nature mentioned comes up, it is advisable in many instances from a cost and sales angle, to change a dimension or some specification on the drawings rather than making over dies which would perhaps take considerable time and thus delay the date for production, and it might still be difficult to make the part correct to the drawing. Whereas, if the drawing was corrected to fit the part, it would prevent future difficulty and the functions of the part would still be the same as intended.

Types of dies selected for the job.

When it comes to select the proper die for the job, we have plain Blanking Dies, Piercing Dies, Forming Dies, Progressive Dies, and Compound Dies. Then these dies are classified into "AA," "A," "B," "C," "D," etc. To make the right selection of dies, I would not make any suggestion. It is safe to say, however, that any of the mentioned types and classes can be used for producing the desired parts, but what is the most economical type and class I do not know at present. After all, it really is a matter of cost, but unfortunately, too often only the first cost is the consideration when it should be the original cost plus press operators' time plus tool makers' time for maintaining the die in "permanent" condition, divided by the total number of pieces made by the die during its entire life. That will be the cost of the parts.

To illustrate what I mean, here are two pieces made with different types of dies.

No. 1 is made with a one gang compound closed die with automatic stop, rate for press operation 20c per M, production per year 130,000. Total cost per M, including only press operators and tool makers' pay for servicing die—50c per M.



No. 2 was made with a two gang die with solid pin stop. Press operation rate 14c per M. Production per year 110,000. Cost per M, $2.40.

Now what was the cause for the extra cost of part No. 2? What really happened was this: The press operators did not obey the instructions given on Master Method Layout, which calls for single trip. Instead, the operators have been running automatic to earn a higher rate per hour than was possible with single trip, and the result was misfeeding, causing shearing and the high repair time.

Proper use of dies to produce the parts most economically.

There used to be a time when it was considered that to run a punch press did not require any special training, or that it was only necessary to know how to feed the stock into the die and then step on the treadle and trip the press. In some places if a fellow seemed to be somewhat awkward, or slow to adjust himself to factory work, it was the rule to send him to the punch press depart-

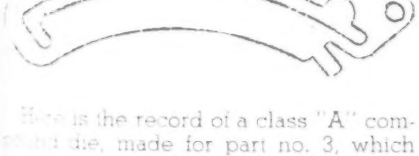
which was supposed to be the where the least skill was re- and therefore, most likely he make good. I have always felt h an attitude was wrong, and ely I believe it is now most gen- nderstood that a good punch perator really is a skilled me- because in many instances stops to think about what the eally is of the dies that an aver- ss operator handles per year. ve found that here in our plant perator who works full time tools worth $100,000 per year. rson entrusted to handle money rities to that amount usually is ducated and trained about his I think the press operators are what overlooked in that respect.

I hope you will excuse my stressing importance regarding press oper- but the years of service in the ame, and the lessons it has given will not permit me to pass over point without mentioning a few in connection with the subject. realize the complicated dies we build in order to keep step with day manufacturing require- but after the tool designer and tool maker have successfully fin- their job, the big question is how that die going to be used. In order to the die properly, the men who are operate punch presses must have a understanding of the principal rking parts and how they should ction, in order to produce the parts st economically.

Regarding cost of punch press oper- I take the liberty to quote from Working of Metals, Power Operations, by E. V. Crane, as ows:

"In all press operations, handfed, only a tenth, or two-tenths of a apiece, including all overhead ues. For very large, slow work, re- two or three men, and a bersome machine, the cost may run as three cents, but that is rare."

Now I am going to give an example, owing what will happen if the dies not given the proper care.



Here is the record of a class "A" com- die, made for part no. 3, which en properly tried out and found O.K. for production. That die was service and on the first produc- only 50 pieces were made; the to be taken out of the press nt to Tool Room for repair; then, second setup, 100 parts were The die was damaged again, re- and set up for the third attempt. time they succeeded in mak- 00 parts; but then the die had to ired by the Tool Room; after the fourth setup 300 pieces were made, and the die sent to the Tool Room. Now here is the result:

Total number of parts made, 2,500; cost of the four repairs was $241.00, making the parts cost $95.00 per M., or 9.5 cents apiece.

If the die had been properly set the first time, there would not have been a single penny maintenance expense for such a small run.

When repairing dies it is important to check up and make sure that the dies will function properly. For instance, if a die is sent to the tool room for sharpening and replacement of a broken punch, and the die is so constructed that there are several punches in the set, then all of them should be carefully checked for size to make sure some of them are not worn down to the low limit, because if left in that condition, it will cause extra shut downs for replacement of undersized punches. When servicing combination blank and draw dies, it is important to maintain the original curvature of the surface over which the metal is drawn. The best way is to have a template made from the die after it is found to work satisfactorily.

There are various opinions regarding the usefulness of pilot pins on punches. My experience with them has not been very satisfactory, and quite frequently the trouble with certain dies has been eliminated when such pilots were removed. Dies should be so designed that when pins must be used they should be located in the margin of the stock, or between the blanks if practical and possible. Some of the difficulties which have come to my attention are: distortion of the hole caused by pilot pin strain when stock is not exactly in proper position, or too frequent breaking of pilot pins, and if stock is thick enough and pilot pin sufficiently strong, quite often the punch and die is sheared because punch will be deflected from its proper alignment to the die on account of inertia of the stock. Therefore, when designing dies, it is well to give due consideration to those points or else the dies will require too much service. If die is made of any of the high wear resistance type of tool steel, no part of the cutting members should be substituted by lower wear resistance steel, when repaired. It is an old adage that,

"A chain is no stronger than its weakest link."

The leader pins in the die set should be carefully checked to see that they are of proper length. Quite often it happens that a die has been subject to excessive wear and repeated grindings causing the leader pins to be too long, preventing setting die to proper depth.

In this connection I wish to call attention to a few points here which contribute a great deal to make "permanent dies impermanent." Blanking and piercing dies when properly set up, should be so adjusted that when blanking or piercing punch has sheared through the stock they should enter the die only a few thousandths of an inch. The purpose of setting the die so close that it barely parts the metal is to save die life. There may be many comments on setting a die so it will cut paper, but when we use the metal which the punch is to pierce, we find it will be necessary to set it deeper and deeper until the punch will part the metal, and then we find that perhaps the punch goes into the die .025" to .050" too deep. There are several reasons for that.

1. The press is not rigid enough
2. Opening in bolster plate might be too large so it will not support the dieshoe properly
3. The die might not be sufficiently stiff to withstand the pressure without deflection
4. It may be a combination of the previously mentioned causes, not to forget that quite often the die setter did not use proper care.

To operate dies without sometimes misfeeding does not seem to be possible, but when a punch enters into a die .025"-.050" too deep and a misfeed happens, then both punch and die are sheared the same amount, and will have to be ground off that much to restore the die to proper condition. If punch had entered the die properly, nothing serious would have happened.

Inspection Standards — When speaking about them, it should be understood that they are not set by the Inspection department, but really are the results of Engineering and Methods departments' requirements. But the Inspection can sometimes stress their requirements rather far, by insisting on having a die taken down for sharpening because there is more or less burr on a hole which is to be tapped, or insisting on very close uniformity in formed parts. Often the importance of raw stock being of uniform quality is a subject which seems to me is not given proper consideration. When we are fabricating parts, too often dies sent to the tool repair with the complaint, "Die is no good," will not form to B.P. The facts about the case might be something like this:

The die was originally working satisfactorily, and accepted as O.K. by Inspection. Afterwards, an order was run through and the die was stored in die crib. The next order came, same die taken out and set up, but this time it did not form correctly. Now, here is when someone is called upon to decide the following questions: Has the die all of a sudden changed in some way by standing on the shelf in tool crib, or is there some difference in the material? In this case it seems obvious it must be the material and, therefore, the logical thing should be to secure the proper material if possible.

Inspection departments, as a rule, are well informed about the manufacturing difficulties and, therefore, should be in a position to render great help in lessening the "impermanence" of dies.

In conclusion, I hope we all realize that the only permanent die is one never taken out of Die Crib.

Tool Engineers Must Qualify for Greater Responsibilities

By

DON FLATER

WORKS MANAGER, CHRYSLER DIVISION
CHRYSLER CORPORATION

In last month's article it was pointed out the opportunities that exist for the Tool Engineer to gain knowledge through the source available in his line of work that would fit him for further responsibilities, providing he makes an effort to do so.

Before making an effort to gain knowledge and experience it is necessary for the Tool Engineer to study and determine just what is required by industry for personal qualifications that will gain individual recognition and advancement. A self-analysis should be made to determine which of these is lacking in your experience.

There are many phases of engineering but particular attention should be given the following definition: An engineer is a person who has the ability to execute and manage, to plan and superintend, and to organize.

The basic principle of organizing any industry lies in delegating authority, fixing responsibilities, and applying experienced knowledge in such a way as to attain the objective in the most effective manner. No one person, division, or department can exist by individual efforts alone. We organize in order to coordinate and cooperate, and only by so doing, coupled with the "will to do" of the individual, can we succeed in any common effort. Hence, it is most advantageous to study the art of organization. The Tool Engineer should develop a wide range of interest and ability, and learn to be a combination of a craftsman, teacher, manager, businessman, arbitrator, and salesman. To be successful the following traits should be outstanding: Personality, organizing ability, job knowledge, leadership, business ability, will to cooperate, loyalty, initiative, and good judgment. There are many individuals with whom you work that possess the above qualifications and in whom you will be able to recognize these accomplishments. Study to determine what must be done by observing their actions to instill the same desirable requisites in yourself.

Learn to test your growing knowledge the same as you would test a machine for mechanical efficiency. Become familiar with the practices of manufacturing that successfully convert raw materials into finished products by direct efficient methods that utilize a minimum of energy and time.

A survey made in the United States of 15,000 business failures shows the main fundamental cause to be that of inexperience. This contributed toward more causes of bankruptcy than any other condition. This data alone is convincing that the fundamentals of business management must be obtained to advance further in the business world.

Production, and in fact the performing of any operation whether it be direct or indirect, must be accomplished at a minimum of cost in order to allow the purchase of the article by more people, thereby increasing production and employing more people. It is, therefore, most essential than an understanding be had of the analysis of cost, how it is set up and how controlled, what it means in competition, and how it effects the production of the article by bringing it within the range of the purchasing power available. When considering unit cost, as far as direct labor is concerned, the overhead connected with the job must be given utmost consideration as this, in practically all cases, exceeds that of the direct labor performed. Information covering burden rates, how set up and controlled, can usually be obtained from the Burden Control Supervisor.

Watch for wasteful methods, train yourself to recognize wasteful methods, thereby obtaining experience, and where found existing call the condition to the attention of the person responsible. This will teach you to be observing and analytical.

There is no industry in which costs are better known than the automotive, and this is one of the main reasons for its remarkable results. Tool Engineers, in setting up operation sheets on new parts, should give cost and quality the utmost consideration in arriving at the design of machines, tools, and fixtures. However, keep in mind short time amortization of equipment. After having arrived at a tentative sequence of operations and type of tools and equipment, the Tool Engineer should then resort to one of the available sources of information, which is Time Study, and determine from this department whether or not the line-up meets with Time Study approval as to whether it is considered the best one possible from the standpoint of cost, maintenance, and ease of operation. Most time study men have had sufficient experience in this line of work to quickly recognize a method that is not the most advantageous procurable. They know exactly what is being done on like parts in the shop and are familiar with many of the methods in other plants, therefore, their experience should be utilized to the utmost to enable the engineer to become familiar with that branch of manufacturing and obtain further experience through theirs. I believe that continually consulting the time study man in different divisions will aid in lining up operations for the most economical production, and it will be found that this is a source of information which one cannot fail to overlook and which will result in rapidly becoming a more efficient Tool Engineer. Naturally when a reputation has been built up for this type of operation the Management is going to recognize the fact that the work is satisfactory towards promoting economical manufacture and is therefore a point that will gain rapid recognition.

One of the great losses in any fabrication is that of scrap, and one of which the average Tool Engineer does not give sufficient consideration. After having tooled a job and it is in production, scrap reports may usually be obtained from either the inspection or the production foreman. In most cases, after a job is tooled and the foreman finds that the tooling as set up has a tendency to cause considerable scrap to be produced or inaccuracies that may not constitute scrap, the foreman will at once request the Tool Division to make the necessary corrections. It is expensive to make corrections after equipment is completed and does not reflect a desirable attitude toward the Tool Engineer who originally recommended the method. By analyzing scrap records and obtaining the quantity that is being produced, and the cause of it, a more satisfactory method on future assignments will be developed. Determine just what rework or post-operations it has been necessary to perform and the reasons for them. Possibly no one knows or has a greater anticipation of what will cause scrap and rework, than a production foreman, and here again his experience and foresight should be utilized by discussing these conditions with him. This will greatly assist to more efficiently perform the engineering and maintain the scrap at a minimum in the departments where tools, machines, and fixtures are responsible for it.

As these individuals are contacted for their complaints, ideas, and comments, the Tool Engineer will realize how advantageous it is to be able to discuss manufacturing problems with other members of the organization who have had considerable experience. The folly of being self-contained in your activities will be more appreciated.

Always remember that practical knowledge is not usually obtained at a desk. The school of experience is at the point of activity. Hearing how the job is done and seeing how are two different things. Facts obtained through observation are more lasting.

The Lathe

OLDEST, MOST USEFUL OF MACHINE TOOLS

PART 1 - IN A SERIES

By

D. C. FORSMAN

Technical Editor

MEMBER
A.S.T.E.

NOTWITHSTANDING the tremendous growth of the machine tool industry, comparatively few people know the history and development of machine tools. It is with the thought of providing a few fundamental facts that these articles are prepared.

The lathe may be justly termed the most important of all metal cutting machine tools. Not only on account of the rapidity of its execution, which is due to its continuous cutting while many other machine tools cut intermittently, but also because of the great variety of work it will perform to advantage. In addition to the general operations of the lathe, drilling, boring, reaming and other processes corresponding to those performed on the planer, shaper and broaching machine may be performed very efficiently. The forms of cutting tools employed in the planer, drill press, shaper and boring machine are all to be found among lathe tools, while the work holding devices employed in lathe work include, substantially, very nearly all those employed on all other machine tools and many others peculiar to itself.

In almost all the mechanic arts, the lathe in some form or other, is to be found varying in size from a jeweler's lathe of a few pounds to a turbine builder's lathe weighing many tons. The lathe is the oldest of machine tools and exists in a greater variety of forms than any other machine tool. Figure 1 shows a lathe of primitive construction, and is believed to be in use in remote places in the world today.

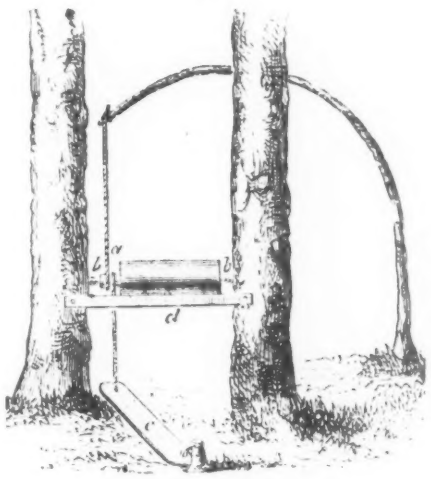


Figure 1. Example of earliest known type of lathe.

At the Vienna Exhibition, some eighty years ago, there were exhibited wood bottles, wood vases, etc., made by Hercules, the remnant of an old Asiatic Nation, in remote parts of Galicia, in the dense forests of the Carpathian Mountains. The lathe they used has been known since time immemorial. They made cones, or centers, of maple wood, shown at bb in Figure 1, one center was fixed, the other movable (longitudinally). It was customary to rough out the work with some sort of hatchet, making one end cylindrical to receive the rope for applying the rotary motion through the foot pedal shown. Cross bar (d) is fastened to the two trees so as to form a rest for the cutting tool, a chisel of some sort; (c) was the treadle, (a) the rope attached to a sapling or pole to get power to rotate the part being turned.

In other forms of ancient lathes, a wooden frame was made to receive work centers and one of these work centers was carried in a block capable of having an adjustment along the frame to suit the different lengths of work. In place of the sapling, a lathe was employed to derive power for rotating, and here, probably, the LATHE—as a machine got its name. It is obvious, however, that with such a type of a lathe, no cutting action could be performed while the work was rotating backwards, further, that during this period of tool resting, it was liable to move and the cut would not coincide with previous cuts when the directions of work was reversed and tool feeding recommenced. This lathe, of course, was very crude, although once used, it is merely brought to your attention here as the beginning of the most useful of machine tools.

I was rather fortunate when serving my apprenticeship, to mingle with some

(Continued on Page 30)

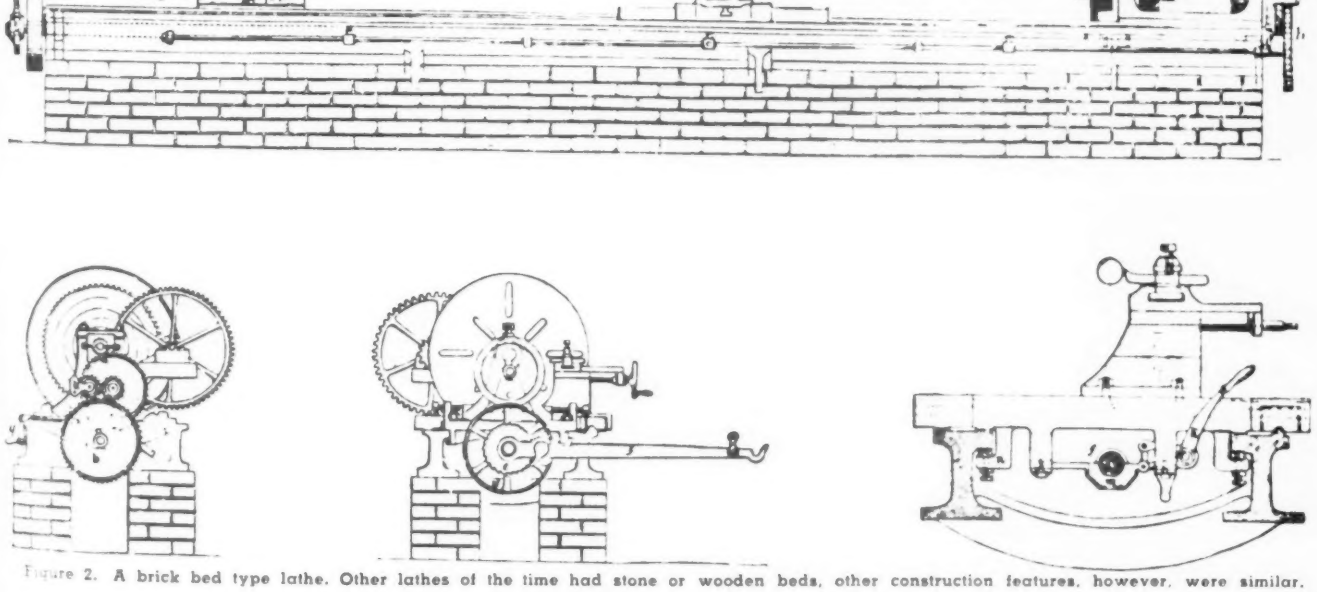


Figure 2. A brick bed type lathe. Other lathes of the time had stone or wooden beds, other construction features, however, were similar.

TOOL PIONEERS

By

RALPH E. FLANDERS

President, Jones & Lamson Machine Company

An address at the first anniversary meeting, Rockford Chapter, American Society of Tool Engineers, September 29th, 1938.

Doubtless some of you gathered here tonight attended the annual meeting of the American Society of Tool Engineers at Detroit last March. If so, some of you heard, or had the chance to hear, a talk which I gave at the banquet on the subject "The Tool Engineer and the World He is Making." I wish tonight to go briefly over some of the points there mentioned. Our subject this evening is a continuation of that presented at the Detroit meeting.

We considered the fact, you will remember, that the number of white inhabitants in the Michigan peninsula 200 years ago was negligible and that 400 years ago there were none. The region was inhabited by some few thousand red-men who lived by hunting, fishing, and crude forms of agriculture. Then later the white-men came, at first in small numbers and then in larger numbers; and the peninsula supported a population of a few tens or hundreds of thousands of inhabitants on the simple agricultural basis of the first half of the 19th century. Then came the machine age, the building of automobiles, and other complex mechanisms and products; and under those conditions the number of inhabitants which Michigan supports numbers not tens or hundreds of thousands, but millions.

The development of the mechanical, financial, and merchandising processes which make possible the support of these millions in a comparatively small area is complicated beyond description or comprehension. No single human mind can explain it or grasp it. Our whole modern civilization is a vast, intricate mechanism operated by the cooperation of great groups of people who never see each other or even know of each others existence.

The heart and center of this mechanized industry is the group of Tool Engineers. The product designers have labored diligently through years of growing experience to design the parts and to make them of the most economical and serviceable material. It has been your specific task to fit the machines to the performance of the work to be done. You have had not merely to furnish the equipment required, but you have also, in many cases, devised the processes and, as a result of this skill and experience, have been effective in improving the design of the parts you are making. Day by day, month after month, year after year, your contributions have steadily brought modern products within the reach of more and more millions of your fellow-citizens. Many other groups have had a share in this process, but your share has been at the very heart and center of the undertaking.

For this important work you have had some reward. Some of it has been the material reward of salary paid for services rendered. For most of you there has come as a further reward the opportunity for exercising your faculties in a position of major importance in carrying forward the greatest experiment that the human race has ever undertaken. When we look over the history of an industrial region, we get some conception of what the nature of that experiment has been in the world as a whole.

The nature of the enterprise is this—to see whether by greater and greater cooperation, and greater and greater complexity of organization, it may not be possible to furnish more and more millions of people with more and more necessities, comforts and luxuries, and with opportunities for enjoying the higher things of life. As we have seen, this process is dependent upon complexity of organization and a high degree of cooperation. That complexity and that cooperation are so involved that we can hardly view the process without amazement as to how it can be successfully carried on. And yet, carried on it is for long periods of time. That it breaks down from time to time is not astonishing. Our astonishment should be that it can be made to work at all.

The significant element in this great development in which we have had a part is the pioneer work. I need not emphasize in this place tonight the importance of the pioneer. One hundred and four years ago, my own grandmother as a babe in arms crossed this state a few miles south of here in a covered wagon headed for the little town of Keosauqua, Iowa, where her father planted a new home. Being a Vermont Yankee, he was disturbed by the fact that there was no mill to grind corn within 100 miles of the place where he staked out his future. He thereupon built in the Des Moines River a mill of which the local historian says, "The like has never been seen before or since, but it ground our corn." Here was pioneering not merely of the sort which occupies new land, but of the sort which occupies new areas of industry and invention.

This city in which we are meeting has been the scene of a great pioneering venture. Not only from the Eastern seaboard did the early settlers come. Tens of thousands came from across the sea, and brought with them skilled handicrafts and generations of experience which found a fertile soil for growth in these prairies of Illinois. Each one of the richly varied industries of Rockford goes back to a beginning which was real geographical pioneering, under conditions which took courage and persistence

But let us look now at the changes which have taken place in our industry as a whole, the country over.

Up until 1900 our pioneering was mainly in the direction of the design and building of better, more accurate and more universal machines. The milling machine, the turret lathe, the radial drill, and many others, went through a long process of development. But beginning about 1900 a new series of inventions took place in materials and processes which opened out new territory to the Tool Engineer. This series of inventions has taken place during my own active machine-shop life.

The first of them was high speed steel, introduced by Frederick W. Taylor at the Bethlehem and Midvale Steel companies. The discovery of this steel doubled and tripled the cutting speeds on machines of all kinds and initiated the complete re-design of the whole machine tool line to give greater speed and greater strength so that the capabilities of the new cutting tool could be used.

The next development in order was that of cylindrical grinding as a production process. Until the early 1900's cylindrical grinding, external or internal, had been a tool maker's operation made with light cuts and little wheels to produce accurate dimensions on small hardened pieces. But during this period Charles E. Norton had the conception of using the grinding wheel to remove stock at a high rate, while at the same time retaining to an even greater degree the accuracy of the light, flimsy, toolmaker's grinders. This idea he carried to a splendid completion and now grinding is used for sizing both in the soft and in the hardened condition of present-day machine-shop materials and material is removed so rapidly that the lathe has practically ceased to exist

as finishing operations are concerned.

With the improvement in grinding following the wide-spread use of alloy steels. When the oldest of us were boys, there were practically only three or four forms in which steel was used in machine construction. It was used as soft machine steel, carbonized machine steel, cold rolled steel, and hardened tool steel. Practically every piece in the highest grade of machine tools was made of soft steel. Now there are few small parts indeed in a machine produced by a high-grade manufacturer in which the steel has not gone through some process of hardening, or toughening or treatment to resist crystallization. The alloy steel and the heat-treating furnace have replaced the simple practice of earlier days.

About the time that alloy steels came into the picture, and particularly when they began to be used in large quantities in the development of the modern automobile, the development of drop forging took a forward spurt. Drop forgings had been made for years, but only of simple forms and under special conditions. Now this product has become so well developed that even in small lot manufacture simple drop forging dies are used. These save their cost sometimes in a few dozen pieces in the number of pounds of material otherwise wasted as chips which the use of drop forgings saves over cut-off bar stock. When to this is added the saving in machining, the economy of the drop forging in modern design and construction is assured.

A succeeding development was that of die casting. The development of new non-ferrous alloys made possible the casting in permanent dies of intricate shapes so closely sized as to eliminate practically all machining operation. Even threaded holes are cast in the die.

A following development, and one which has not yet reached its limits, is of the entirely new series of plastic materials made from almost every imaginable substance under the sun, but quite generally with bituminous coal as the base. These plastic materials are finding increasing use for machine parts in which a metal is not necessary. They decrease cost of machining and add tremendously to appearance. A good serviceable machine can be given real style by a proper use of plastic materials.

The use of the diamond as a cutting tool is an ancient practice. Formerly it was used only in extraordinary circumstances where no other material would serve. Of late years it has come to be a regular machine-shop process, taking the place in many cases of both internal grinding and reaming. The diamond has a great advantage in holding accurate size over hundreds and thousands of operations without needing adjustment.

The next development is one with which we are all familiar. Carbide tools were introduced only a few years ago, but the improvements in quality and price of the last few months have given them a new interest and a new usefulness. Here, as in the case of high speed steel, the more general use of carbide tools requires the re-design of machine tools, particularly giving them higher speeds so that the full capacity of the new cutting material becomes available.

As incidental to these new high machine tool speeds, it became necessary to refine the driving gearing of machine tools. Otherwise, the racket arising from a 1500 RPM gear driven machine spindle would have made the shop insupportable to those condemned to work in it. Gear shaving, grinding, and lapping processes have solved this. Modern turret lathes with spindles running at 1500 RPM are quieter than those of ten years ago whose top speed was only one-fifth as much.

The Tool Engineer who was alive to his opportunities followed these developments as fast as they appeared and made the best possible use of them. Not only did he use these developments, but he contributed very largely to their improvement; and in so doing advanced his own professional standing. It is exceedingly important that we should have the frame of mind of being receptive to these new developments as they appear, instead of feeling that our own stock in trade lies in the experience which we gained in earlier years. It is, I take it, the purpose of this organization to assist its members in maintaining week by week, month by month, year by year, a close contact with new developments in machines, tools and processes, as they appear.

I feel no hesitation, therefore, in calling your attention this evening to the most recent example of tool pioneering, which is the development of thread grinding as a machine-shop process. Like cylindrical grinding before Charles Norton's time this has hitherto been a tool-maker's operation, used on gages, fine taps, and similar parts. But within the last two years; the developments in this field have been such that thread grinding becomes an economical shop operation for the manufacture of parts whether in small or large quantities.

Like the developments in cylindrical grinding, it offers the combination of accuracy and production, particularly if the thread grinding machine itself is designed to maintain size, even though the wheel may be trued down to several inches smaller than its original diameter. To such an extent has the process been developed, in fact, that in many cases it is possible to grind threads in a hardened part faster than it is possible to mill them when soft.

Furthermore, the tool expense is very low. The emery wheel is an inexpensive tool and is constantly re-sharpened by the trueing device incorporated in the machine. This is particularly important for fine threads on alloy steels, a condition wherein the maintenance of thread mills and thread milling hobs has been a very serious matter. On many materials it is exceedingly difficult to preserve the points of a milling tool for any length of time. The point of the grinding wheel, on the contrary, is constantly renewed.

There are elements of interest both in the machine and in the process. In the machine the great advance has been in the introducing of automatic trueing and sizing, the use of large wheels, and the provision of an abundant mass of metal to absorb vibration. In the process itself, the great advance has come from taking cuts clear to the limit of the breakdown of the wheel for the production of a single piece. This is dependent on the analysis and hardness of the steel being ground and also, of course, on the grain, grade, and bond of the wheel. There is, however, the additional surprising experience that the cutting compound used is a determining factor. Certain oils have been developed which prevented loading of the wheel. It is the free-cutting action of a properly lubricated wheel which permits the rapid removal of metal without generating heat, and thus brings the whole process into the high production field.

The time is now here when with modern thread grinding conditions ordinary workmen—not tool makers—can grind threads on hardened parts faster than they can be cut by any other process and at the same time produce threads which are not only true with the other ground cylindrical surfaces, but are well within the limits of class 3 or even class 4 tolerances and have the finest of form and finish.

The screw thread has been about the last machine-shop element to hold out against combined accuracy and production. Its day has now come. Cheap but inaccurate threads, or accurate but expensive threads, are a thing of the past. We may now have threads that are both cheap and accurate. The day is here when the sight of an unground thread on a hardened shaft or spindle will be an offense in the sight of the builder or purchaser of high grade machinery.

Let us close by returning once more to the general subject of tool pioneering. It is tool pioneering which alone can make possible our hopes for more leisure and a higher standard of living for the years to come. Without it our shorter hours can only be attained at the expense of our living standards. It is significant that for the first time modern production methods are arousing interest in France. The shorter hours now in effect in that country have made mechanization necessary. Without it, French industry is coming to a standstill.

Even more important is the dependence on us for their very existence of a large percentage of the earth's population. As we saw in our analysis of the history of Michigan, it is the tool pioneering following the geographical pioneering which permits enormous

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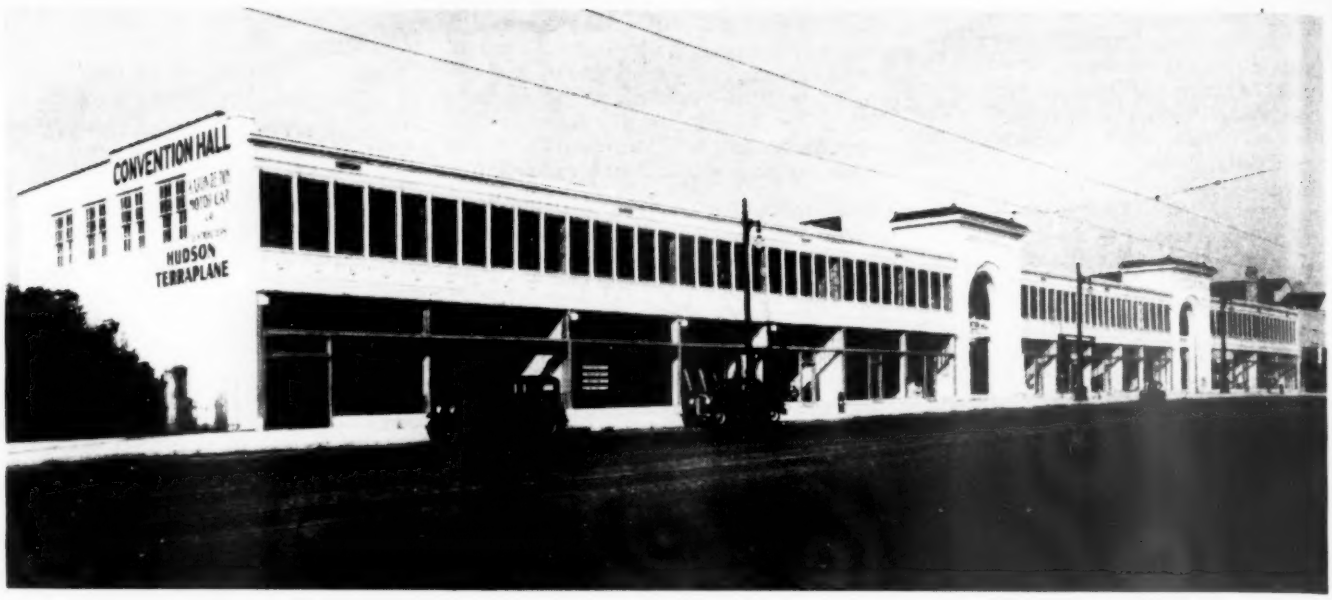


Another milestone for Tool Engineers, all over the country, will have been reached when the doors to Convention Hall in Detroit open at 9 a.m. on March 14 for the second, and considerably larger, American Society of Tool Engineers' Machine & Tool Progress Exhibition.

Program of Machine and Tool Progress Exhibition Announced

A Symposium on "Surface Finish"—with proponents of all methods of accurate surface finishing presenting papers on grinding, lapping, diamond boring, honing, "super-finishing," etc. will be a highlight of the 1939 A.S.T.E. Convention March 14th to 18th.

A second symposium, entitled "New Developments and their effect on the Tool Engineer," will bring together in one evening session a highly important group of papers on new methods, materials, equipment, etc. of prime interest to Tool Engineers.

In setting up the program for the 1939 convention, the aim has been to obtain as great a diversification of interest as possible, while condensing all papers to the "meat" of the subject treated, and keeping the number of technical sessions at a minimum.

There will be no day-time technical sessions, leaving Tool Engineers free to visit the 1939 Machine and Tool Progress Exhibition as well as the numerous industrial plants in Detroit in which special plant tours have been arranged for convention week.

General opening of the convention will be Tuesday, March 14th, with registration at Convention Hall, where technical sessions as well as the Exhibition are to be held. The day is set aside for visiting plants and exhibits, followed by the "surface finish" session Tuesday evening.

J. R. Weaver, Director of Equipment, Purchases, Inspection and Tests, Westinghouse Electric and Mfg. Company will lead off the discussion followed by papers by representatives of Ex-Cell-O Corporation, Micromatic Hone Company, Heald Machine Company, and the Chrysler Corporation. The session is under the direction of Carl J. Oxford, Chief Engineer, National Twist Drill.

There will be no technical session on Wednesday. The session devoted to "New Developments and their effect on the Tool Engineer," is scheduled for Thursday evening. It is under the direction of Chris H. Borneman, Supervisor, Tool and Gage Service Department, General Electric Company, Schenectady, N.Y. The annual dinner is scheduled for Friday evening, March 17th.

Homer Bayliss, Motch and Merryweather Machinery Company is General Program Chairman for the Convention, assisted by William Sherman, Detroit, Editor, The Iron Age.

The exhibition will be closed early on Wednesday and Friday evenings, according to present plans. Tuesday and Thursday it will be open until 10 P.M., and will end at six P.M. Saturday. It should be quite a show.

As to convention arrangements, each A.S.T.E. chapter will be sending out shortly, letters to management executives of industry in the chapter area, urging executives not only to attend the show themselves, but also to encourage their own Tool Engineers to come to Detroit.

Each exhibitor at the show is being furnished free of charge with 100 engraved invitations -- carrying the name of the exhibitor and his booth number. Each chapter is receiving a similar number of engraved invitations. Additional numbers may be purchased at a nominal charge. Every member of the A.S.T.E. of course will receive his own invitation.

It is planned also to continue the policy adopted last year by the A.S.T.E. of rebating to all members attending the show at their own expense, a sizeable portion of their railroad fare to Detroit, at so much per mile, thus enable attending members to share directly in the success of the 1939 exhibition.

A registration fee of 50 cents will be charged at Convention Hall for all non-members not carrying invitations. The registration charge will entitle the visitor to participate in plant tours, attend technical sessions, etc., however in addition to visiting the show.

This method of handling attendance at the show has been decided upon to restrict attendance to those having a definite business interest in the exhibition and technical meetings. The prices

(Continued on Page 22)

TOOL STEEL

By

M. W. DALRYMPLE

METALLURGICAL SUPERVISOR
BETHLEHEM PLANT
BETHLEHEM STEEL COMPANY

ACCORDING to a recent advertisement in THE TOOL ENGINEER there are three factors back of a good tool: design, material, and heat treatment.

The Tool Engineer is responsible for the design; the metallurgist, for the material and its heat treatment. The Tool Engineer and the metallurgist are therefore so closely associated that a talk on Tool Steel is justified at a meeting of Tool Engineers, because tool steel probably constitutes 90% or more of the material from which you construct the tools employed in your daily work.

Are there many kinds of tool steel? Yes, 24 or more types which differ in analysis one from the other.

How are they identified so that one may know with what type he is dealing? This is sometimes difficult because Tool Steels are sold under brand names and there are at least 804 brands sold by 78 manufacturers or dealers. There are, however, several ways to identify the type of Tool Steel represented by a particular brand.

a) Look up the description of the brand in the dealer's catalog.
b) Ask the salesman.
c) Analyze the steel.

Is there any simplified way in which Tool Steels may be classified? Table 1 represents an attempt to classify the various types in 6 groups. From this table it is possible to more or less approximate the function of the steels in the various groups. A Tool Engineer should select his material for a given tool from Group 1 unless the requirements of the tools necessitate the toughness of Group 2, the hardness of Group 3, the non-deforming properties of Group 4, the heat resistance of Group 5, or the high-speed cutting abilities of the steels in Group 6.

The emphasis placed on the steels of Group 1 is due to the fact that the Simple Carbon Tool Steels are generally more efficient than the more expensive alloy steels on any job for which they are suitable.

Table II shows the steels that make up Group 1. Type 1 of this group is a steel which is essentially an alloy of iron and iron carbide. This type of steel can be purchased in a wide range of hardenability and toughness. Toughness is the essential characteristic of lower carbon steels of this type; hardness, of the higher carbon steels. In addition to the variation of toughness and hardness that is obtainable by variation of the carbon content, it is possible to obtain steels of the various carbon contents that are controlled as to the depth of chill and refinement of fractures which will be obtained upon quenching the steel in brine.

Variation in depth of chill occurs on shallow, medium, and deep hardening types of 1.00% carbon tool steel after quenching ¾" diameter specimens from temperatures of 1450° to 1600° F. in 10% brine. Steel of the shallow and medium hardening types is comparatively tough by virtue of the soft cores and refined fractures that exist after quenching from a wide range of temperatures.

Type 2 of Group 1 shown on Table 2 is a simple steel to which .15/.25% Vanadium has been added. The purpose of this Vanadium addition is to insure a fine grained, shallow chill in the hardened steel. This type of steel was widely employed before the control of grain size and depth of chill, described in the previous paragraph, was developed.

Type 3 of Group 1 shown on Table 2 is a simple steel to which .10/.50% Chrome has been added. The purpose of this addition is to secure greater depth of chill on hardened parts than is usually obtainable on simple steels of the straight Carbon type.

Figure 1 is an example of the application of Group 1, Type 2, steel for an intricately shaped die. The keen cutting qualities of Carbon Vanadium steel were the factors which influenced the choice of this type steel for this die.

Table 3 shows the 4 types of alloy steels in Group 2. These are designed primarily for toughness. The major metallic alloys which are employed in the steels are named in this table.

Table 4 shows the 3 types of steel comprising Group 3, designed primarily for hardness. The outstanding characteristic of the 3 steels listed in this group is extreme resistance to wear or abrasion.

Table 5 shows the 4 types of steel in Group 4 which are distinguished by their non-deforming properties.

Group 4, Type 2, steel is used for various types of cold working dies

TABLE 1

TOOL STEEL GROUPS

GROUP I
Simple steels: Hardness and toughness governed by carbon content.

GROUP II
Alloy steels: Designed primarily for toughness.

GROUP III
Alloy steels: Designed primarily for hardness.

GROUP IV
Non-deforming alloy steels.

GROUP V
Hot work die steels.

GROUP VI
High-speed cutting steels.

GROUP I

Simple steels: Hardness and toughness governed by carbon content.

Type 1. Carbon.
2. Carbon-Vanadium .15/.25.
3. Low Chromium .10/.50 Cr.

TABLE 2

GROUP II

Alloy steels designed primarily for toughness.

Type 1. Silicon Manganese.
2. Chromium Vanadium.
3. 1-2½% Tungsten Alloy Chisel.
4. Medium Carbon, 11-12% Chromium.

TABLE 3

GROUP III

Alloy steels designed primarily for hardness.

Type 1. High Carbon, Low Tungsten (1.00-2.50%).
2. High Carbon, Medium Tungsten (3.00-6.00%).
3. High Carbon, 12-13% Chromium.

TABLE 4

GROUP IV

Non-deforming alloy steels.

Type 1. Nickel Chromium.
2. 1¼% Manganese, plus Cr., W., or Mo.
3. 1.6% Manganese.
4. High Carbon, 12-13% Chromium.

TABLE 5

GROUP V

Hot work die steels.

Type 1. Chromium Vanadium.
2. 1-2½% Tungsten Alloy.
3. 3-4% Chromium.
4. Chromium Nickel—7% Max. Chromium, 1½-2½% Nickel.
5. 1½-7½% Tungsten, 1½-7½% Chromium.
6. 8-15% Tungsten, 2½-3½% Chromium.

TABLE 6

GROUP VI

High-speed cutting steels.

Type 1. 18-4-1 Tungsten Chromium Vanadium.
2. 14-4-2 Tungsten Chromium Vanadium.
3. 18-4-2 Tungsten Chromium Vanadium.
4. 8% Mo., 1½% W., 4% Cr., 1% V.
5. 18-4-1, plus Cobalt.
6. 14-4-2, plus Cobalt.
7. 18-4-2, plus Cobalt.

TABLE 7

which require the use of a steel of good hardening properties which would not appreciably deform in hardening.

Group 4, Type 4, steels are selected for use of a non-deforming material of high wear resistance.

Table 6 shows the 6 types of heat-resisting tool steels in Group 5.

Figure 2 shows the comparative ten-

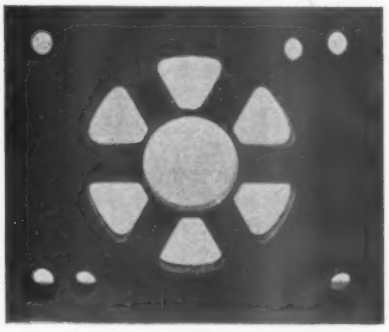


Figure 1—View of intricately shaped die made from Bethlehem Best steel. Group I, Type 2. Used to successfully replace oil hardening steel to obtain keener cutting edge. Dimensions: 1¾" x 8" x 10".

sile strength and impact resistance of 2 of these steels, types 3 and 6, when tested at the temperatures shown. The graph illustrates the superior properties of the more expensive tungsten steel when heated to temperatures as high as 1200° F.

Table 7 shows the 7 popular types of high-speed cutting steel, comprising Group 6.

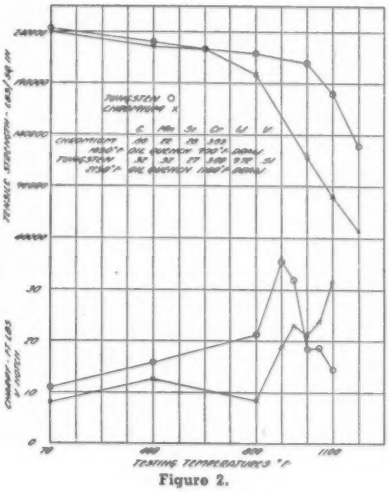


Figure 2.

It should be borne in mind when considering the figures for average life shown on Figure 2 that the relative service of tools made from the various analyses would undoubtedly vary under different sets of conditions. This is true because there is no one type of steel that will be found generally superior under all types of service.

In this rather elementary talk on tool steels, different types of steels have

(Continued on page 43)

Production Perspectives

News of Mass Manufacturing from Everywhere

Indications reported here last month, favorable on the whole, for mass manufacturing industries—continue to indicate **even more evidence** that **1939 will be a good year for Tool Engineers.**

The outlook for 1939 business is considered good by many factory officials. General Fireproofing Company, Youngstown, Ohio, recently voted a 20c common dividend in addition to the regular $1.75 quarterly preferred. Additional government contracts for metal office furniture and equipment necessitated an expansion of operations. **K. M. Schaefer,** Sales Manager **of Federal Motor Truck Company, foresees a 1939 truck sales volume at least equivalent to 1937,** when the number of new trucks sold and registered reached an all-time high. He stated that **Federal was laying plans for one of the biggest years in its history,** predicting that "the **truck industry should registef a total of approximately 600,000 units this year. Philip Rogers, president** of the **Millers Falls Company, Inc., Greenfield, Mass.,** is confident that the business outlook is at least promising. **"Business in 1939," he said "will be reasonably better if events follow their normal course . . ."** One of the good signs for the coming year is the fact that the **International Harvester Company is spending about $6,000,000 on expansion and modernization of two of their plants—$5,000,000** on the **Farmall Tractor Works at Rockford,** Illinois, where a new building is to be constructed, new machinery installed, and the tractor assembly line brought up to date; **and $1,000,000 on the completion of a new foundry at the motor truck plant at Indianapolis.** This means increased business not only for the International Harvester Company but for other industries as well.

New England manufacturers enter the new year on a distinct note of optimism with many of them preparing for considerable improvement in business during the balance of the winter months and the spring months. **This** general **attitude is in deep contrast to a year ago when production was sliding off rapidly at this time. Several** of the **larger New England plants have peak pay rolls at present** and others report the prospect of more employes being called back to work shortly. In general the opinion seems to be that **progress upward will be steady from now until spring** provided the Federal Government does not spring any surprises which may retard the recovery.

Industrial employment in Ohio continued its gain with the improvement indicating **Ohio industrial employment at 87% of the 1926 total.** Columbus alone among the larger cities showed a decline amounting to 1%. **Akron gained 3%, Canton 10%, Cincinnati 1%, Cleveland 2%, Dayton 4%, Toledo 4%** and **Youngstown 4%.**

Despite the usual tendency on the part of industry to delay capital expenditures until the start of a new year, **a survey of** representative **machine tool companies indicated that December business ran ahead of November, the previous 1938 peak for domestic orders.** It is thought that this survey reflects the trend of the industry.

Ohio industries, including 85 Cleveland Companies will construct more parts for military aircraft in the event of another war than any other state in the Union, it is said. Cleveland plants are prepared to convert two-thirds of their production facilities to the building of these parts. They are so well prepared that the production of aeronautical parts can be brought to a supply-equal-demand proportion much quicker than can the manufacture of complete aircraft. This condition is based on the current United States defense program and not under the proposed enlarged national defense program. However, being abreast of current demands clears the way for rapid future expansion. **These facts were revealed January 13, by Major James F. Powell, officer in charge of the United States Army Air Corps Procurement Planning in the Cleveland district.**

Business in the **Pittsburgh** district **swung upward in the first week of January** and regained almost all of the losses recorded during the last two weeks of 1938 according to the Bureau of Business Research, University of Pittsburgh, report of January 13. **In line with the past, erratic changes were shown in the first week of the new year.** The **operating rate of steel increased sharply. Freight shipments originating in Pittsburgh mounted appreciably.**

Neil C. Hurley, Jr., was **elected vice-president of the Independent Pneumatic Tool Company** at a meeting of its Board of Directors held the middle of January. **A substantial interest in the Emsco Derrick and Equipment Company** has been **acquired by the Youngstown Sheet & Tube Company and Republic Supply Company,** including the purchase from E. M. Smith, Emsco president, of all his holdings. **Diamond Braiding Mills, Chicago Heights, Illinois, has been divided into two distinct corporations—Diamond Braiding Mills,** making shoe laces and braids, **and Diamond Wire and Cable Company, manufacturing electrical wires and cables. Inland Steel and Wilson & Bennett Manufacturing Company officers agreed upon merger terms**—subject to ratification by stockholders. Wilson & Bennett manufacture steel containers at Chicago, Jersey City and New Orleans.

National Tool Salvage Company, Detroit at their annual meeting **elected new officers—A. J. Moquin, President; C. W. Videan, Vice-President; Hiram Ash, Secretary** and Treasurer; Frank Price, Samuel R. Kingston, C. W. Videan, Hiram Ash and A. J. Moquin were elected Directors.

Charles L. Morris, Aviation Commissioner, in his recent biennial **report to** the **Governor,** pointed out that **Connecticut ranks third among the 48 states in the aircraft industry.** This ranking, he stated, is based on the number of hourly wage earners. Connecticut aviation industries employ 4,744, California 11,679 and New York 6,277. These figures do not include salaried workers. In propeller manufacture, Connecticut stands first with 821 wage earners in the Hamilton Standard Propeller plant at East Hartford, from a total of 1,047 engaged in the entire propeller industry. **Bridgeport weekly average pay rolls for December indicate a steady climb back towards the 1937 high level,** and **but 5.84% less than the figure for December, 1937.**

J. A. Otterbein Company, Middletown, manufacturer of tools, buckles, zippers, slides and other metal specialties, has **greatly increased its floor space** and is **now manufacturing sleeves for Ballistic Tools, Inc. The Waterbury Farrel Foundry & Machine Company, Waterbury, has received two War Department contracts for tracer bullet machinery and gauging and weighing machines. W. Roy Moore, for many years vice-president and general manager of the Billings & Spencer Company, Hartford, has been named Director of Sales for Peck, Stow & Wilcox Company,** Southington, Conn. **Restoration of full time employment** for a number of employes **at the General Electric Plant in Pittsfield, Massachusetts, is reported.**

With the **one-floor addition already completed at the Chapman Valve Manufacturing Company, Springfield, machinery soon will be installed for manufacture of large-size valves** said **John J. Duggan,** President.

Colonel F. H. Payne of the Greenfield Tap & Die Corporation, Greenfield, **believes business will be better in 1939 than it was in 1938** but not as good as it was in 1937. **He explains that in 1937 heavy buying by manufacturers was prompted by apprehension concerning C.I.O. developments.** This resulted in overstocked shelves and abnormal in-

(Continued on page 44)

February Chapter Meetings

Chapter Meeting Announcements must be received on or before the 20th of preceding month to appear on this page. Members and friends of The Society contact Chapter Secretaries for meeting details if your announcement does not appear below.

BUFFALO

February 13, 1939—7:00 P.M. Place to be announced.

Speaker: Mr. Ralph Flanders, of the Jones & Lamson Co.

CHICAGO

February 6, 1939—Dinner, 6:30 P.M.; Technical Session, 8:00 P.M., Midwest Athletic Club, 6 N. Hamlin Ave.

Speaker: Mr. A. Swigert, of the Chrysler Corporation.

Subject: "Superfinisher, the Machine that has Revolutionized Finishing of Bearing Surfaces."

Reservations: Midwest Athletic Club, Catering Dept., 6 N. Hamlin Ave., Chicago, Illinois.

CINCINNATI

Monday, February 13, 1939—8:00 P.M. Joint Meeting with Dayton A.S.T.E. at Chrysler Air Temp.

Secure bus tickets from officers or any committee chairman. Round trip, $1.25.

CLEVELAND

February 16, 1939—Dinner, 6:00 P.M.; Technical Session, 8:00 P.M., G.T.V. German Club, 1622 East 55th St.

Speaker: To be announced later.

Subject: "Steel and Wire in the Making" (American Steel & Wire), in motion pictures with sound.

Reservation: Mr. H. P. Boggis, Endicott 3611.

DAYTON

February 13, 1939—Dinner, 6:15 P.M., Kuntz Cafeteria, 1225 Troy St.; Technical Meeting at Airtemp, Inc., 1119 Leo St.

Speaker: A M. Swigert, from Chrysler Corp.

Subject: "Super-Finishing"

Reservation: Walter Olt, Fu. 3113.

DETROIT

February 16, 1939—Meeting to be sponsored by New Jersey Zinc Company. Fort Shelby Hotel, Spanish Grill. Dinner, 6:30 P.M. Technical session 8 P.M.

Subject: "Die Casting." The modern fabrication process—including: illustrated slides and sample products. Tools will be displayed and described.

HARTFORD

March 6, 1939—Dinner, 6:15 P.M., City Club, $1.25; Technical Session, 8:00 P.M., Hartford Gas Co. Auditorium.

Speaker: R. O. Breadsley, Jones & Lamson Machine Co.

Subject: "Inspection by Projection."

Important: Dinner tickets must be reserved in advance through R. T. Palmer. Phone 32-0069.

Special Social Evening, Friday, February 17, Saengerbund Hall, Washington street. Lobster dinner, bowling, games, fun, frolic. See special announcement or officers for full details.

PITTSBURGH

February 10, 1939—Meeting, 6:30 P.M., McCann's Dining Room, Diamond and Ferry Sts.

Speaker: Mr. E. E. Griffiths, Director Time Study and Methods, Westinghouse Electric & Mfg. Company.

Subject: "Observations of Manufacturing Methods in Europe."

Also, Pittsburgh Plate Glass Company will show their new moving picture, "Complete Method of Glass Manufacture."

Reservation: Call Miss Wingard, Br. 1500, extension 9264

ROCHESTER, N.Y.

Tuesday, February 14—Dinner, 6:30 P.M., Todd Union, 75c; Meeting, 7:45 P.M., Strong Auditorium, University of Rochester, River Campus.

Speaker: Ralph E. Flanders, President Jones & Lamson Machine Co.

Reservation necessary for dinner only. Bring a friend.

ROCKFORD

Thursday, February 9, 1939—5 P.M. to midnight, Educational Exhibits, Faust Hotel, entire eleventh floor, both ball rooms, private lobby and check room.

6:15—Dinner, entertainment and dinner talk by Walter Wagner, President A.S.T.E. and Master Mechanic Lincoln Motor Co., assessment $1.00. Make reservation by Feb. 7 to Allis Chalmers, Talcott Bldg. Main 6270.

9:00—Lecture by Erik Oberg, editor Machinery Magazine.

Subject: "The Machine Before the Court of Public Opinion."

Extra meeting at Hotel Faust Thursday, February 23, 1939. Watch for announcement.

ST. LOUIS

February 9, 1939—6:30 P.M., Gatesworth Hotel (A.S.T.E. Activities).

Speakers: Ford R. Lamb, Executive Secretary; Bob Keller, Chrysler Corp.

Subject: "Super-Finishing."

Reservation: Dinner, $1.25. Call C. J. Steinman, Newstead 0800.

TOLEDO

February 14, 1939—6:30 P.M., Electric Auto-Lite Co.

Plant Inspection.

Reservation: Call Sec. L. E. Rennell for information. Bus. Phone La. 2161, Res. Phone Je. 2900-W.

TOLEDO

Friday, February 24—Annual Dance, New Secore Hotel.

Reservation: See T. E. Rennell or Dance Committee.

TRI-CITY

(Rock Island, Davenport, Moline)

February 8, 1939—Meeting, 6:30 P.M., Fort Armstrong Hotel, Rock Island.

Speakers: Chrysler Corporation representatives.

Subject: "Super-Finish."

YORK

(Central Pennsylvania)

February 14, 1939—Dinner, 6:30 P.M., 75c per plate; Technical Session, 7:30 P.M.; "Executive Night," West York Inn, West Market and Highland Avenue.

Speaker: Ford R. Lamb, Executive Secretary A.S.T.E.

Subject: "What Is a Tool Engineer?"

BALTIMORE

February 13, 1939—Dinner, 7 P.M.; Technical Session, 8 P.M., Sears Roebuck Auditorium.

Speaker: Mr. C. S. Gates of the Allen Mfg. Company.

Subject: A ticket to continuous performance (with movies).

For reservations call Niles H. Lou, 3815 Glenmore Ave. Hamilton 0851.

TWIN CITIES

(St. Paul-Minneapolis)

February 15—Meeting, 6:30 P.M., Minnesota Union. Election of Officers.

Subject: "Manufacturing of Modern Lathes." Motion pictures on flame hardening of lathe beds.

The program is to be furnished by the Monarch Machine Tool Co.

SYRACUSE

February 15—Syracuse Industrial Club.

Speaker: Mr. R. E Flanders, Pres. Jones and Lamson Machine Co., Springfield, Vermont.

Subject: "Development of Thread Grinding."

BUFFALO

February 13—Dinner, 7 P.M.; Technical Session 8 P.M. Place to be announced later.

Speaker: Ralph Flanders, Pres. Jones and Lamson Machine Co., Springfield, Vt.

Subject: "Development of Thread Grinding."

Second Annual Informal Dance Feb. 24th, Buffalo Trap and Field Club.

PHILADELPHIA

February 2, 1939—First Anniversary meeting—tool exhibition—floor show—refreshments—no business—all fun.

SCHENECTADY

February 16, 1939—7:30 P.M., business meeting, election of officers; 8:00 P.M., lecture, G.E.A.A. Club House, General Electric Co.

Speaker: Ralph E. Flanders, Pres. Jones & Lamson Machine Co., Springfield, Vt.

Subject: "Modern Developments in Thread Grinding and Thread Grinding Machines."

This will be a joint meeting of the A.S.T.E. Chapter No. 20 and the Foreman's Association of the General Electric Company.

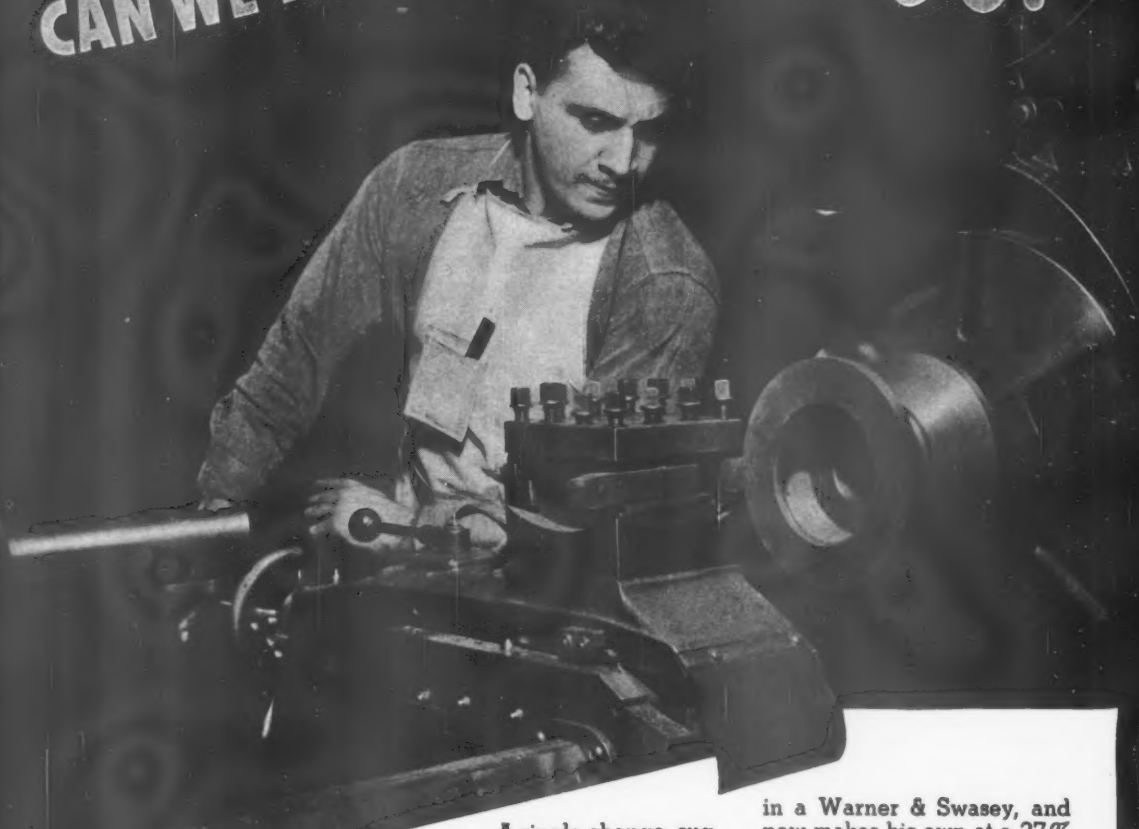
RACINE

February 13, 1939—Hotel Racine.

Speaker: Milt Schmitt, representative Kearney-Trecker Company.

Subject: "Milling Machine and Milling Methods," illustrated with lantern slides.

CAN WE INTEREST YOU IN $1300.?



A single change, suggested by a Warner & Swasey field engineer, increased net profit $1300 a year in one department of an air conditioning plant. A new Warner & Swasey Turret Lathe so improved accuracy and finish that entire grinding operations were made unnecessary.

Another manufacturer had a perfectly good turret lathe, but he replaced it with a new Warner & Swasey Turret Lathe, which is earning 54% annual profit on the investment.

A maker of temperature controls reduced his scrap loss from 25% to 5% because of the greater accuracy of a Warner & Swasey.

A maker of superheaters had been buying unit heads, put in a Warner & Swasey, and now makes his own at a 27% saving.

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These are typical Warner & Swasey savings. They are direct additions to *net profit* because Warner & Swaseys reduce waste, increase production per dollar invested, help make sales by improving product and lowering its cost.

A Warner & Swasey field engineer will study your turning problems without obligation, and show you in writing exactly how much you could save and why. Write Warner & Swasey, Cleveland.

WARNER & SWASEY

Turret Lathes

Cleveland

You can turn it better, faster, for less . . . with a Warner & Swasey

PROGRAM ANNOUNCED

(Continued from Page 16)

dure it is hoped, will give Tool Engineers and other executives, maximum opportunity to study the hundreds of valuable exhibits at the show and reduce the danger of over-crowding.

Those who attended the 1938 show will remember how at times it was almost impossible to get through the aisles. Crowds grew day by day when word of the kind of a show it was went over the country. By the end of the week some 27,000 visitors had registered at the exhibition.

This year—with the exhibition more than twice the 1938 size—with an even greater diversification of machines, tools, processes, etc.—with more new equipment being shown for the first time—additional tens of thousands undoubtedly will be attracted to Convention Hall.

Preview Dinner

This year another important departure will take place. Monday evening, March 13th, there will be a special "preview" dinner to which leading industrialists, educators, editors, ministers, legislators, etc. are being invited. At this dinner, sponsored by a committee of industrialists, headed by K. T. Keller, President, Chrysler Corporation, the "Fact Finding Committee" of the A.S.T.E. under Professor John M. Younger, Ohio State University, will present its first report—on "The Relationship of the Machine to Employment and Standard of Living."

The Committee which heads up the activities of the A.S.T.E. in attempting to find the real facts on this much debated question, is composed of such men as Professor Younger, Chairman; James R. Weaver; John J. Caton, Chrysler Institute of Technology; Professor O. W. Boston, University of Michigan; Professor Carl Horack of California; L. Clayton Hill, President, Dietrich, Inc.; E. W. Dickett, Sundstrand Machine Tool Company; and Ford R. Lamb, Executive Secretary, A.S.T.E.

Already the Committee has accumulated a mass of facts, a digest of which will form part of its first report to the Society and the Nation as a whole. In its studies, it is endeavoring to tie together the various relationships of the machine and employment—the machine and standard of living—the inter-relationship of industry and agriculture as affected by the machine—the contributing factors of legislation, taxation, developments in labor organization, etc.—the creation of "service" employment—the problem of shifts in occupation as either produced or facilitated by the machine—possible contributions by trade schools—distinguishing between temporary as compared with permanent unemployment—the effect of and on the business cycle on and by the machine; etc.

Objects of Study

Here is what Professor Younger has to say on the subject:

"In the controversy regarding whether the machine is or is not a factor in displacing men, the non-technical men who do not know the machine sometimes incline to the first view.

"Men in industry who are familiar with the machine on the other hand, invariably seem to react to the second viewpoint and believe implicitly that the machine does not destroy but rather creates employment.

"For instance they may point to the bolt industry. Screw threads, a hundred years ago, were cut by hand with a hammer and chisel. Few men worked at the trade; their work was scarce, the product expensive to produce. Few people bought them. The invention of the screw-cutting lathe enabled the production of bolts in larger quantities, employing more men to create them. The invention of the modern bolt-cutting machine tumbled costs and prices and sky-rocketed sales. Where ten used to cut bolts by hand there were now thousands employed in this single industry.

"Again, it has been estimated that it would cost $17,850 to build an automobile without machinery, and $3500 to build today's low priced car with partial use of machinery. How many automobiles, it is asked, could be sold at those prices? Obviously the market wouldn't permit the employment of the millions for whom machines have created jobs in this industry—building, selling, and servicing the automobile.

"One could give many instances

(Continued on Page 34)

Provide a
"Selective" control
The simple start and stop of any power movement, the most complex interlocking sequence of operation, and all the varying operation requirements that go between are handled equally well by T-J Pneumatic Controls.
The Machine above—the operator steps on the foot pedal, the work is clamped, the clutch is engaged, and after the work is finished it is automatically released and the clutch is disengaged. Operation, timing, and placement—when and where you need them—with T-J Pneumatic Controls.
Bulletin No. 3 will give you more facts about these systems. Write for it now, include a description of your problem so that we may assist you in the selection of the proper units.
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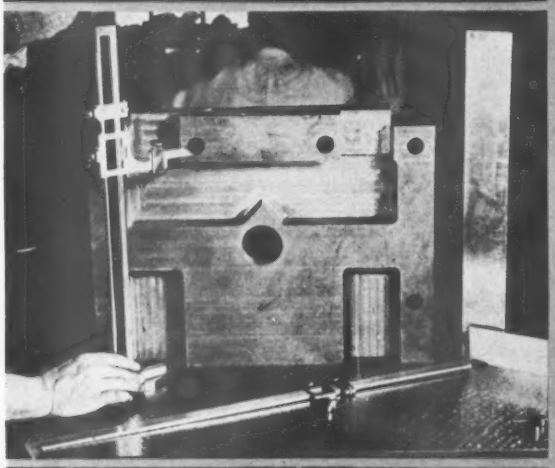

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Chapter Doings

By GEO. J. (JITTER) KELLER

We are starting out another year and it was your columnist's hope that we would be able to shout something about every chapter each month. To me, the A.S.T.E. is the most wonderful organization ever formed. It is the only organization that gives us who have nothing to offer other than practical experience a chance to join an Engineering Society whose basic principles and aims are far above reproach. We don't have to have a college degree and all we need is that knowledge gained through hard work and the bumps one gets on the firing line. If I had the flow of American Language at my command such as Andy Rylander and Ford Lamb, I'd surely tell "youse guys" a thing or two about our organization. You should feel proud and honored to have the privilege of being one of us. If I could make a first line cheering squad out of all these publicity chairmen—Boy—oh Boy what a column this would be. Hold the phone—we're going to start off now.

"Believe it or not," with apologies to Ripley, Chapter No. 22 at **York,** Pa. came through. We'll give you the works just as we received it. Nov. 15th, 51 members and guests attended the dinner and meeting. John Darrah of the Ed. G. Budd Company, Philadelphia, gave an illustrated broadcast on welding and fabrication of stainless steel. On December 13th, 42 members and guests were present for the dinner meeting. Malcolm F. Judkins, Firth Sterling Steel Company, did the shouting about Tungsten Carbide Steel Uses and Application. This was illustrated by movie films and slides. On January 10th, S. C. Spaulding of the American Brass Co. addressed 80 members and guests after the dinner, on the selection of steel for the design and heat treatment of tools. This talk was illustrated with lantern slides and was well taken. They are already making plans for attending the convention in Detroit in March. That's swell, Graby, will look for more next month.

Syracuse Chapter held their meeting January 4th at the Syracuse Industrial Club with 75 members and guests assembled to hear A. W. F. Green, Metallurgist of Ludlum Steel Co. talk on the Molybdenum of High Speed Steel. Another interesting feature was a vacation trip via movie film up the Pacific Coast to Alaska. Mountain sheep and bears were the principal game and the fishing—Oh Boy.

Apparently New Year's Eve was too near the January 3rd date for the Rochester Engineers. With low vitality plus an icy slippery night, less than 100 turned out to hear Mr. Green of Ludlum Steel.

Buffalo Engineers turned out 150 strong on January 9th, when members and guests assembled for dinner at the Trap and Field Club. Guest speaker was Mr. Green of Ludlum Steel Co. The business meeting consisted of electing Al Siegel and yours truly to the nominating committee to nominate officers for this year.

Dayton Chapter produced a double feature during the month of January. They met on January 5th, to hear Hans Ernst, Director of Research of Cincinnati Milling Machine Co. who spoke on "The Physics of Metal Cutting." Very interesting pictures were also shown. The second part of the double bill was shared by Messrs. Ford Lamb, who boosted the coming show in Detroit in March, and O. J. Snyder, Dir. of the Physical Laboratory of the Morse Twist Drill Co. New Bedford, Mass. who traced the history of twist drills. The business meeting consisted of electing Emerson Carmony and Harley York on the nominating committee for officers for the year.

N.Y—N.J. chapter met on January 10th to hear two engineers of the Aluminum Co. of America speak on "Machining of Aluminum." J. F. Coneen of the Edgewater, N.J. plant was speaker No. 1 and he was followed by R. L. Templin from the Research Laboratories at the New Kensington, Pa. plant. Mr. Green from Ludlum Steel Co. also gave an enlightening talk followed by a film showing hunting of big game in Alaska. At the business meeting P. V. DiCosmo and Eugene Beland were elected to the nominating committee for election of officers next meeting. Tom Orchard says the way things are going at least 500 tickets will be sold for the theatre supper dance at the International Casino on Feb. 17th, indicating the steep price of $10 per couple is no deterrent to tool Engineers bent on having at least one good blowout a year.

Baltimore started off the New Year with a bang up meeting on January 12th when 250 members and guests gathered for dinner and to hear R. F. Templin and J. F. Coneen of the Aluminum Company of America. This talk was well soaked up by the engineers and a knowledge of the machinability of Aluminum and its application are of prime importance. From cooking pots to aeroplanes this metal runs the field. So get out your books, boys, study up on your aluminum. Youll find it an interesting story.

Too bad, **Cleveland,** that a change in your meeting date makes it too late for the Tool Engineer. Let us hear from you anyway every month. We want to know what you're doing even if it is a month late.

Philadelphia got off to a good start in January with 226 Engineers and guests present. Their speaker was T. O. Bjornberg, Consulting Engineer of the Illinois Tool Wks. Chicago. His talk on gears was highly interesting. The entertainment committee really went to town also. Several members of the Arion "Gesang Verein" sang numerous solos. Adolph Merta, Gen. Foreman of the Lanum Mfg. Co. got quite an ovation for his "The Evening Star" and "Asleep in the Deep." James Hohn of Allegany Metal Co. was equally good. His "Sweet Mystery of Life" and "Road to Mandalay" were well received. A two act floor show donated by Schlosser Mfg. Co. was greatly enjoyed.

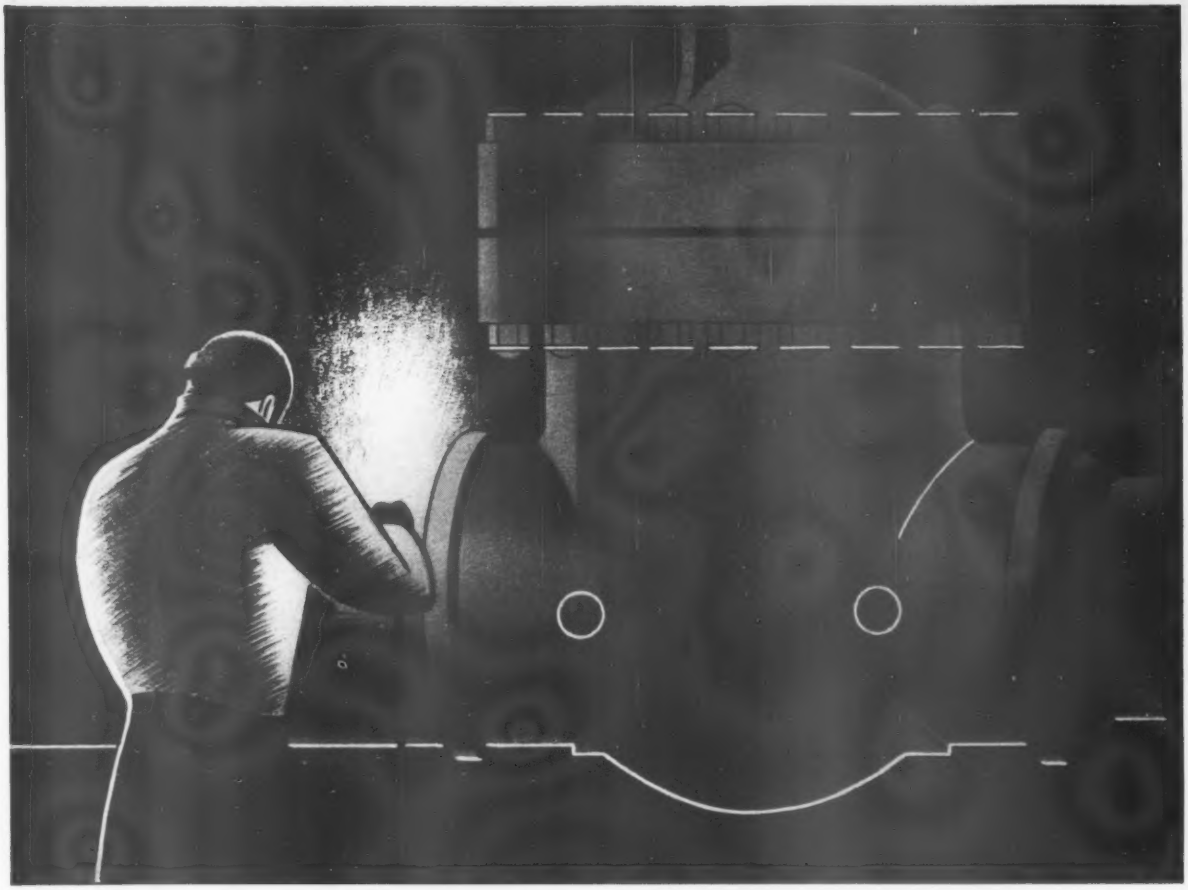
Bridgeport put out the SRO sign at their January meeting. E. V. Crane of E. W. Bliss Company gave an interesting talk on the plastic and cold working of metals in drawing and swageing. Eddie Nevins and Karl Berger were elected to the nominating committee for new officers next month.

Chicago held a record meeting Jan. 9th in the Corwith plant of the Crane Company. One hundred fifty members and guests took the plant tour. An additional group of Crane employees numbering 100 joined the A.S.T.E.ers in a turkey dinner. The plant tour started at 1:30 P.M. After the tour Crane Company opened the doors of their Research Laboratory. Master of Ceremonies at the dinner meeting was C. E. Cook, Supervisor of the Tool Cribs of Crane Co. V. P. Rumely, Wks. Mgr. and L. W. Wallace, Director of Engineering, gave addresses of welcome. A. E. Holstedt, Director of Employee Relations of Crane Company, spoke on "Personnel Problems of Today." J. J. Kanter, Metallurgist of Crane Company spoke on "Problems in Materials." Clifford Ives, Chairman of the Chicago Chapter thanked the Crane Company and all who made this meeting a big success.

Schenectady Chapter met November 10th at Rice Hall, 150 strong to hear R. O. Beardsley of Jones and Lamson Machine Company, who presented an illustrated lecture on "Inspection by Optical Projection." W. Gluesing presented a moving picture entitled, "A Trip Across the United States and Canada."

Pittsburgh started the New Year with their largest crowd to date. Two hundred members and guests heard R. E. Haisley, Metallurgist, and Robert T. Keller, Asst. Supervisor of Production Research of the Chrysler Corp. The out-of-town guests included a delegation from General Electric, Erie Works, and 6 engineers from the Landis Tool Co., Waynesboro, Pa. There were 4 fellows from Mellon Institute and 3 from Gulf Research Laboratory. D. L. Shelly was back after a long illness. Pittsburgh has a membership drive in progress. Two teams headed by Major W. B. Pierce and Major J. P. Wiley are out to double the membership. Sounds good, boys,

(Continued on Page 32)



IT'S 10 TO 1

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What is more, Carbon-Molybdenum steel not only meets the physical requirements, but comes within the cost limitations that always exist. We will gladly send our technical books, "Molybdenum in Steel" and "Molybdenum in Cast Iron", free to any engineer or production man interested in improved materials giving more per alloy dollar.

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MOLY

Handy Andy's . . WORKSHOP . .

In a previous issue (just which I don't recall, time flying fast) I mentioned a feeling of kinship with our advertisers. You see, I know some of them rather intimately, having been in their employ, some because of having used their equipment, some vicariously, through meeting their sales representatives, others again from seeing their names issue after issue. Which is another way of saying that, to be effective, advertising should be consistent. Like the drops of water that, dripping, dripping, finally make impress in the hardest stone. Constant advertising wears down sales resistance, impresses itself on our subconscious minds and click! —it's there when we want it.

▼ ▼ ▼

If, now, I mention a few of our advertisers, I'll ask the rest to be patient; I'll try to get around to 'em all given time. And even if fired I'll pass the job on to my successor. You see, with me it's a friendly gesture (I really haven't a thing to do with the advertising) yet, in a measure, I feel beholden to our advertisers. For they make the Tool Engineer possible, as they make most publications possible, and in turn, our many members and readers make their ads profitable. It works both ways, the kind of co-operation that makes America set the pace for the industrial world and the A.S.T.E. for the engineering.

▼ ▼ ▼

"Way back in," for instance, I worked for Brown & Sharpes, my first job as a journeyman, by the way. (Like many of our Tool Engineers, I cut my industrial teeth in the shop) "Jimmy" Morpeth—of whom I have kindly memories—sent me up to the Gear Shop under Ben Waterman, who has since achieved considerable fame as as a gear expert. I met B. W. in Cleveland a few years back—along with some other old timers from B. & S.—at the Machine Tool Show, and picked him out of the crowd just by his walk. A positive sort of stance, he has. But to go back to the Gear Shop: the automobile, by then past its embryonic stage but still in its swaddling clothes (the Model T was yet to be conceived) was beginning to revolutionize the gear industry, although gearing was anything but the scientific process of this day.

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However, Brown & Sharpes had the jump on their competitors in the early days, what with building their own automatics besides having the very latest in shapers and generators. And, in addition to the ultra-modern, in a fine plant, there were a few early machines by way of contrast. One of them, a hand operated vertical—the progenitor of the automatic, I believe—was kept producing for the special benefit of one Mr. Tanner, then a (clean shaven) graybeard who has since gone to his reward. That is one of my nice recollections about Brown & Sharpes, that they kept their old employees, even to the extent of maintaining, in superlative condition, the machines that they loved and had grown used to. A very practical sort of social security, eh?

▼ ▼ ▼

Later, during vacation from college, I worked in the milling machine assembly, later again, during the upswing from the li'l depression of '07–'08, I worked on the Cutter Tool Job (regarding which Louis D. Spence and I hold a secret in common). And my general impression of Brown & Sharpes is one of precision and thoroughness; the concern is conservative and dependable, the product on the whole above criticism. Yet, perhaps their greatest contribution to industry is trained men; they have maintained a superlative apprentice school, and many ranking executives are graduates of that school, men as dependable as the manufactured product of the firm that is their Alma Mater.

▼ ▼ ▼

A few years later, I entered the employ of Pratt & Whitney, with very happy recollections, B. M. W. Hanson was Works Manager then, a fine gen-

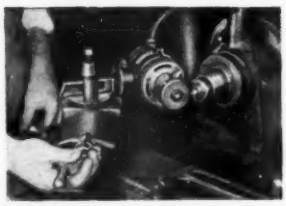
(Continued on Page 28)

New! STANLEY No. 150 CONTOUR GRINDER

Costs Only $69.50 COMPLETELY EQUIPPED

Including Light Fixture, Extension Cord, Switch, Chuck, Arbor, 6 Wheels, 2 Rotary Files, Wrenches.

Sturdy 12" x 12" table. Adjustable light that swings clear for big work.



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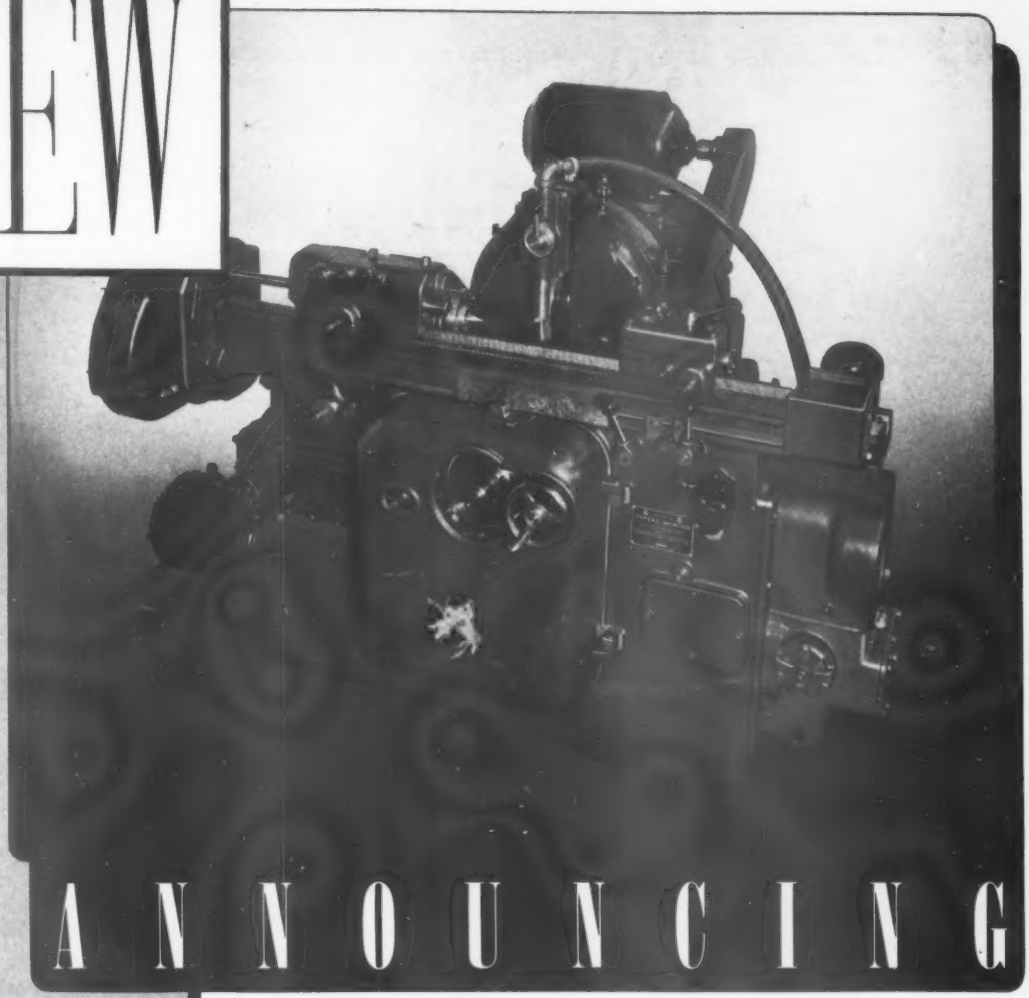

ANNOUNCING

THE 5 x 30" J&L AUTOMATIC THREAD GRINDING MACHINE

The 5 x 30" J&L Automatic Thread Grinder has been designed for all types of thread grinding work on small parts. It is suited equally well to tool room lots or production work. The 5 x 30" machine will swing work 7 inches in diameter and 30 inches long. It will grind threads 5 inches in diameter, 12 inches long, anywhere on work 24 inches long. . . . Literature giving complete details and specifications will be sent on request.

"A MACHINE WITH A BACKGROUND OF 20 YEARS OF THREAD GRINDING EXPERIENCE"

JONES & LAMSON MACHINE CO.
SPRINGFIELD · VERMONT · U·S·A·

HANDY ANDY

(Continued from Page 26)

tleman and an outstanding engineer who later became co-founder of the Hanson-Whitney Mfg. Co. And the keynote of P. & W. was (and remains) precision! Their tool room — where I worked—was very modern and excellently equipped, the executive personnel of the plant efficient and progressive, Mr. Woglum (I still have a letter from him somewhere in my dusty archives) was Superintendent, Mr. C. L. Goodrich Tool Room Foreman, and Mr. Ericsson in charge of the department where I helped to maintain P. & W.'s reputation for "Accurate Tool Work"—the title of the authoritative book on tool room practice at that time. Mr. Goodrich and F. A. Stanley, the associate editor of American Machinist, were co-authors. I have the book, published 1908.

▼ ▼ ▼

The jig borer and the thread miller were still an engineer's dream at the time, and while P. & W. was largely a pioneer in both processes, and brought these machines to a high state of perfection, I am given to understand that thread milling was first used in a United States arsenal, that Mr. Hanson's genius perfected it. But we got precision results with buttons, productive of uncanny accuracy when used by a skilled toolmaker (as myself, of course). One of the boys, Fred Brink—a sub foreman ——had a promising future, went back to Germany and fought on the German side in the world war before Uncle Sam entered the Big Debate. Wonder what became of him? Well, there were heroes on both sides, in that affair, and I am sure that Fred accredited himself. Prosit, Ol' Timer, wherever you are! The years have rolled by since then, and Pratt & Whitney's has progressed with the rest, has achieved an enviable reputation as a producer of fine tools, machinery and, latterly, airplane engines. Of the later personnel I am personally acquainted with only one, our very likeable and up-and-coming A.S. T.Eer, A. H. d'Arcambal. Here's to you, d'Arc!

▼ ▼ ▼

Another concern with whom I made a comparatively brief sojourn is Federal Products Corp., of Providence, although that was before it loomed on the national horizon. In "them days" it was known as the M.A.N. Mfg. Co., located on West Exchange St., and started out to develop and manufacture a radical type of screw machine. Billy Hoyt was superintendent, Frank Carpenter general foreman, Charley Hurd chief engineer (although we just called him the Old Man). He was an ex-Taft-Pierce man, a clever designer and a cleverer tool and die maker. Later, the concern branched out, began making dial gages, which now seems to be the firm's specialty. And darned good gages they are, as the users will attest.

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While I never worked for the concern, B. C. Ames of Waltham, Mass., must come in for honorable mention. (Funny, I don't see their name in the late issue of the Tool Engineer) I was using Ames gages while still an apprentice, and had one in my hands just a few days ago, no more reliable, it seems, but just as sensitive to the slightest error as its predecessors of some decades ago. They built well, those Easterners, established standards of precision that have had a considerable bearing on the automotive industry as well as mass manufacture in general. Well, so much for a start; I'm going to get around to the rest in due time. And say, any little reminders or criticism will be appreciated; just don't throw bricks in return for a well meant bouquet. Yours 'til we meet again.

Handy Andy

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American Society of Tool Engineers
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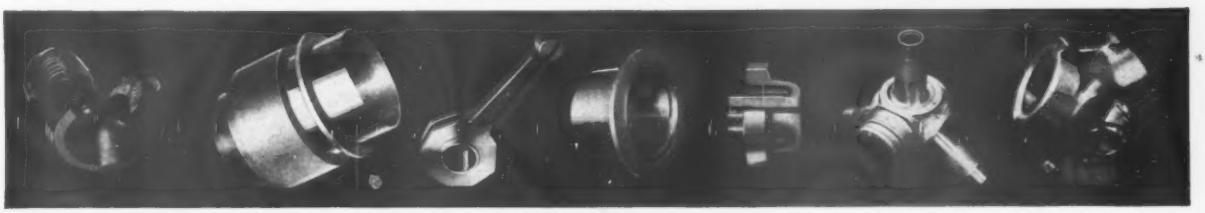

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LATHE—OLDEST TOOL

(Continued from Page 13)

real oldtimers of the early American tool builders, some of them came direct from families whose granddads and dads were building lathes before Civil War days. Let us linger just awhile with these old time companies long forgotten by most people.

Early History in America

A brief genealogy would read something like this—Phelps & Bickford Company, where S. C. Coombs came from —to start S. C. Coombs & Company. With him were such men as R. Shepard, Martin Lathe and A. Whitcome. Their plant was located in Worcester, Massachusetts, and established about 1845. They started lathe building, and shortly after 1849, Alonzo Whitcomb also broke away to start C. Whitcomb & Co., who "built planers." Shepard and Lathe left the Coombs Company and started the Shepard, Lathe & Company, which later became Lathe and Morse Company, then Draper Machine Tool Company, from this to Whitcomb Blaisdell Machine Tool Company.

Pierson Cowie was experimenting with planers around the year 1843, "chain type," his small company, was later taken over by Woodbury, Light and Company, which later became Wood, Light & Company, with which Company P. Blaisdell was connected. This Blaisdell later started the well known P. Blaisdell Company which in its day was one of the foremost of lathe builders, starting this company in 1865. Connected with this company were such well known tool builders of that era as S. Hildreth, father of Charles E. Hildreth who was well known in the present machine tool age, Enoch Earle, Currier J. Snyder. P. Blaisdell & Company was merged in 1905 with Whitcomb Mfg. Company which became a part of the Whitcomb-Blaisdell combine.

With the Oldtimers

Being connected with Whitcomb-Blaisdell I often heard the oldtimers tell who first made this or that improvement. So, let us sit in with these oldtimers and hear their versions.

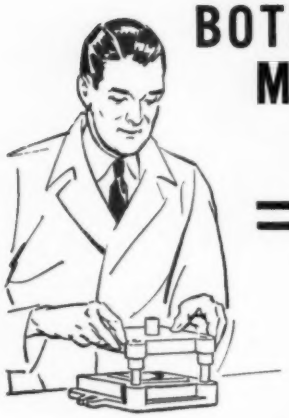
The small gang would gather around during "noon hour," swapping stories of the past. There was Sampson, a mighty clever "contract" mechanic telling of the early lathe bed or bed piece as it were. I can remember when a boy the lathe bed was made of wood, it was laminated, having iron ways and legs. Then Bill Blaisdell would chin in after taking a good size chew of Mayo's cut plug—that was in the days before they ever heard of it being roasted or "toasted"—"Say, Sam, did you ever see lathes with stone beds? I saw one down in the old junction plant, it had iron ways, too, fancy iron legs, it was more sturdy than the wooden bed type." Then they would start, "Who made the lathe with the first cast iron bed?" They would credit it to Sam Flagg around the year 1840. Logical enough, as Flagg was connected closely with Wheeler' Foundry Company, who were in business as early as 1823 and were leaders in their time. Let us state for clearness at this point, that at this early date there were no lathe building concerns or specialists of any prominence, they were in and out—they would build lathes, then something else, again back to lathes. They would talk of lathe beds bricked up with iron ways, so one can readily see that our early lathes were crude compared to our present day types.

We will leave you for this issue to resume next month.

Plastic for Mass Production of U. S. Planes

A new plastic process by which airplane wings and fusilages may be turned out on a mass production basis was revealed in Washington recently. The new process was described by Dr. George A. Bakeland, of the Bakelite Company, who said the wings and fusilage of a plane could be made in two hours with the aid of but nine men. This, it was indicated, is about one-twentieth the time required at present with present manufacturing facilities.

IT'S A GOOD DEAL
THAT SAVES
BOTH SIDES
MONEY



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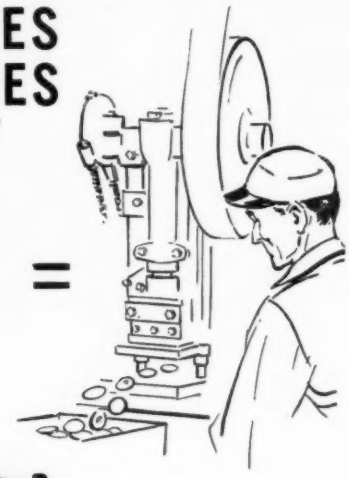

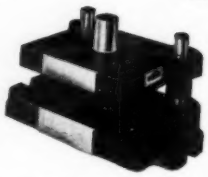

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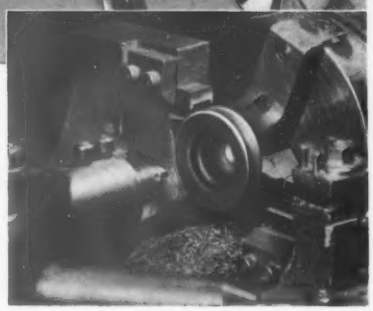

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City_____ State_____

CHAPTER DOINGS

(Continued from Page 24)

let's see you do it. We will watch for further developments, so keep us posted.

Milwaukee got off to a good start in January. Elliott Stewart of William D. Gibson Company spoke on both technical and non-technical phases of spring design and manufacture. Wallace Barnes Co. presented a film on processing wire and flat springs. All the engineers received a fine slide rule from Mr. Stewart. Andy Anderson and K. J. Papke were elected to the nominating committee. Milwaukee also wants to send good wishes to their former Publicity Chairman, Emmor Houston, in his new venture on the West Coast. How about a chapter out there, Emmor.

Racine broke all records the night of January 16th with an attendance of 150 members and guests attending the dinner and lecture. Ford Lamb gave a very interesting outline covering the growth and work of the society. He dwelt at length on the coming exposition. Vascaloy Remet Corp. sponsored the meeting and their Mr. George Mencke gave an illustrated talk on "Machineability of Metals." A short business meeting was held after the regular meeting. Adolph Zaborowsky and Hollis Gordon were elected to the nominating committee. Of special interest to the engineers present was a machine and tool exhibit, held from 5:00 P.M. until the dinner hour in the lobby of the hotel. All of the tools and machines were loaned to the society for the evening to create added enthusiasm to the regular technical session. None of the machines or tools were actually operated doing work, but were merely on display for the engineers to check and examine.

Cleveland Student Chapter met in Fenn College Dec. 14th with 27 members present. Chairman Carl Leska introduced Geo. V. Woodling, Patent Law Attorney and instructor of patent law at Fenn College who gave an interesting talk on "Patent Law." Fenn Chapter also attended a special meeting given by Fenn Society of Civil Engineers on Dec. 16th. A movie was shown in Fenn tower on Dec. 22nd which was well attended. The title of this film was "Enduro, Republic's Perfected Stainless Steel." Two new applications for membership were taken in.

Hello—hello—I'm back on the wire again and as I was saying—Believe you me, these A.S.T.E.ers are really doing things. If you don't believe it just listen in on the line occasionally.

For the **Cincinnati** Chapter, we are turning back the pages of the calendar to the December meeting. This meeting was held December 13th, at the Ohio Mechanics Institute. Don Nerswick, Vice-Chairman, was at the plate due to the absence of Chairman Weber. Full membership was present and in addition a large number of guests. Six new members were announced. Dr. Hans Ernst of Cincinnati Milling Machine Company gave an interesting broadcast after which a lively discussion followed. Lunch and the usual 4 kegs of amber fluid disappeared after the meeting. The January meeting was also held at the Ohio Mechanics Institute. C. V. Johnson, Small Tool Div. Pratt & Whitney Company, gave an illustrated talk on gages, thread gages and Electro-limit gages. Over 100 members and guests were on hand. After the discussion the usual lunch was served in the lunchroom. Geo. Diers, Treasurer, was voted a very good provider. Fred Schoeffler and John Elfring were chosen as nominating committee to make selections for the coming year's officers.

December 8th, **Rockford** had another bang up meeting. They were hosts to approximately 100 members of the U.S. Army Officers Reserves, Chicago Division, which takes in northern Illinois and all of Wisconsin. Several changes had been made in the arrangements. As members and guests approached the registration tables, their names were taken and they were tagged by three beautiful girls. Boy—was that a surprise. The 25 exhibits were set up in the south ballroom. This visitation lasted from 5 P.M. to 6:15 when nearly 300

(Continued on page 42)

IS DEEP DRAWING OF STAINLESS STEEL A PROBLEM WITH YOU?

IF SO, WIRE OR WRITE AT ONCE FOR FREE WORKING SAMPLE OF

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EXTRA HEAVY DUTY DRAWING COMPOUND

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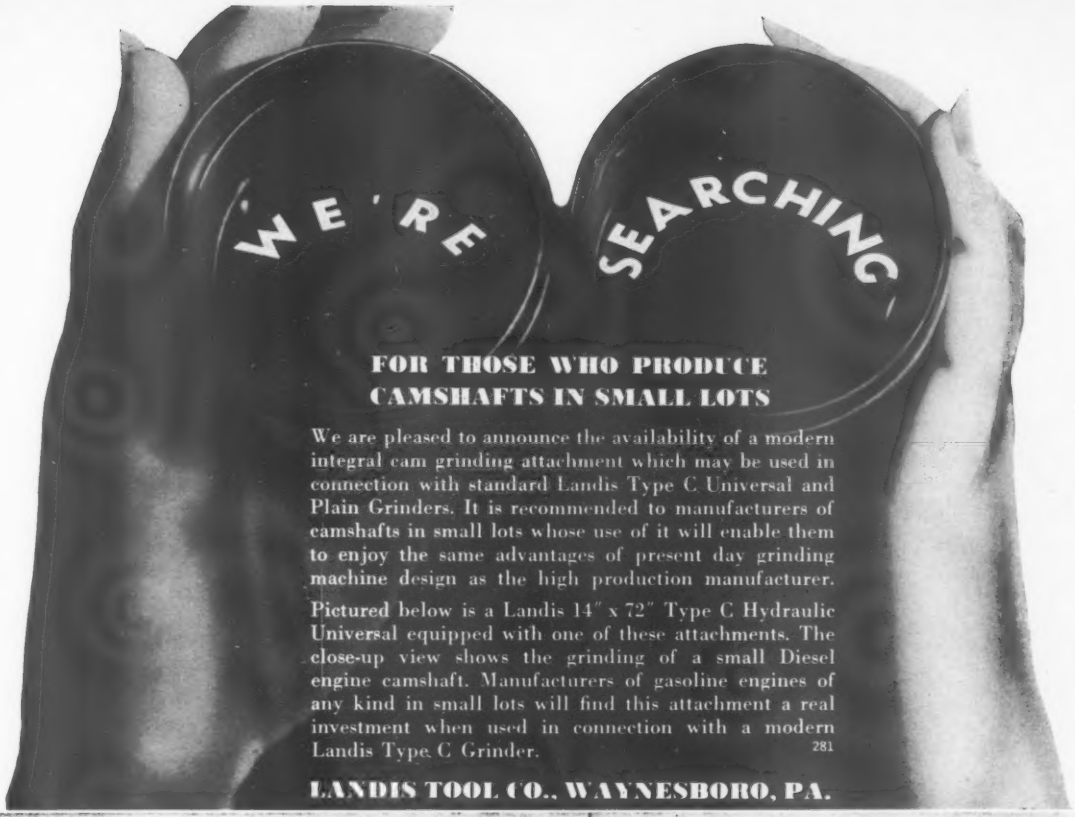
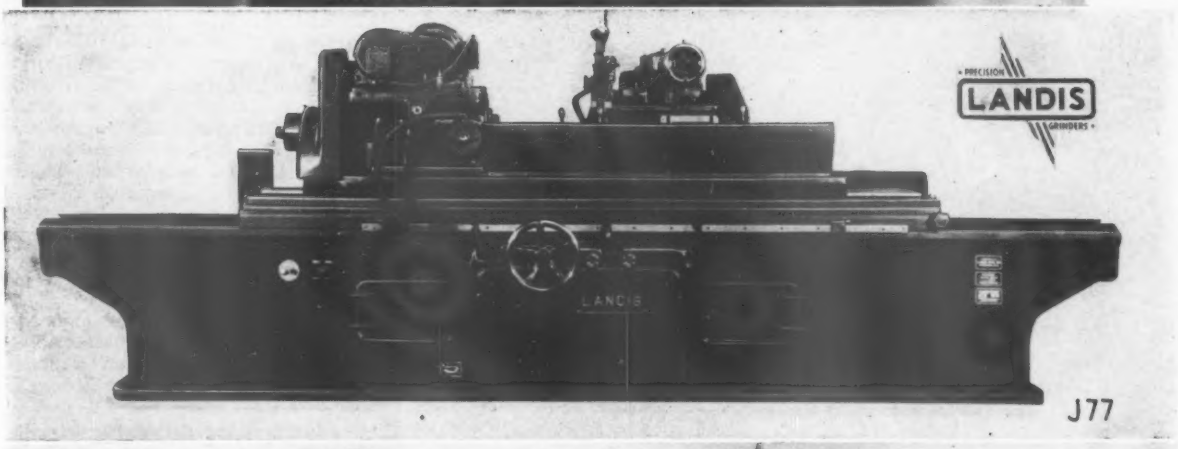


FOR THOSE WHO PRODUCE CAMSHAFTS IN SMALL LOTS

We are pleased to announce the availability of a modern integral cam grinding attachment which may be used in connection with standard Landis Type C Universal and Plain Grinders. It is recommended to manufacturers of camshafts in small lots whose use of it will enable them to enjoy the same advantages of present day grinding machine design as the high production manufacturer.

Pictured below is a Landis 14" x 72" Type C Hydraulic Universal equipped with one of these attachments. The close-up view shows the grinding of a small Diesel engine camshaft. Manufacturers of gasoline engines of any kind in small lots will find this attachment a real investment when used in connection with a modern Landis Type C Grinder. 281

LANDIS TOOL CO., WAYNESBORO, PA.



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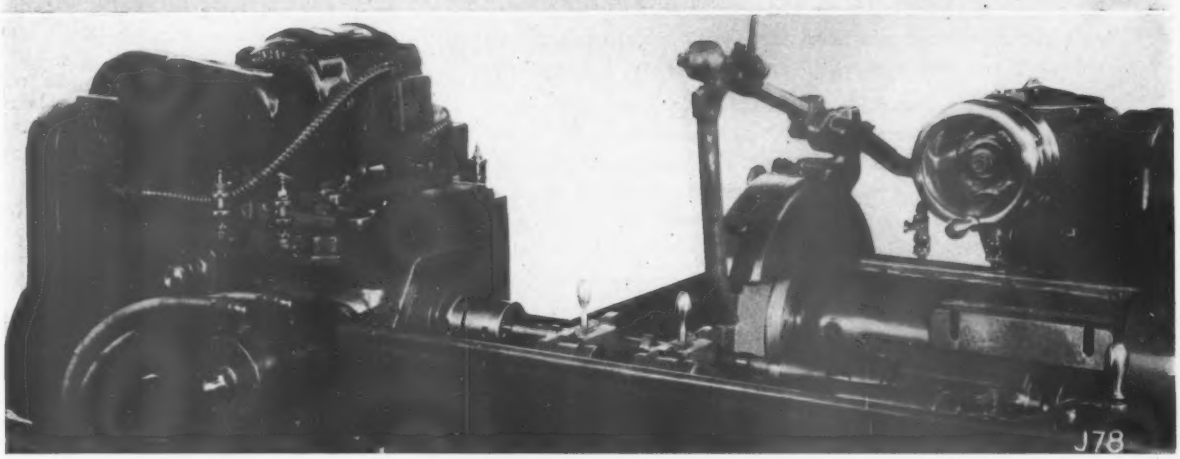


J78

PREPAREDNESS

(Continued from Page 9)

by the selected companies, making it possible to get into instant production should the emergency arise.

"We have," said Colonel Johnson, "a complete set of master gauges for every ordnance item. These, of course, could not be used for production purposes without being rendered useless in a comparatively short time. Manufacturing gauges are being made for the production requirements. Tool facilities are being sought for this class of work."

Within a period of six months, a machine tool debit is to be determined for our entire defense preparedness program. During a time of war, reliable inspectors become a real need. This problem is also receiving the serious attention of Colonel Johnson's staff.

The general staff of the United States Army demands in these modern times skilled mechanics for the combat divisions. In the effort to solve this problem, draft boards would be asked to defer drafting skilled men in industry for whom a long period of intensive training is required. The allocation of men in the field of skilled mechanics would have to be accomplished with the utmost of judgment to give a mutually unified and a safe program to both the combat divisions and industry.

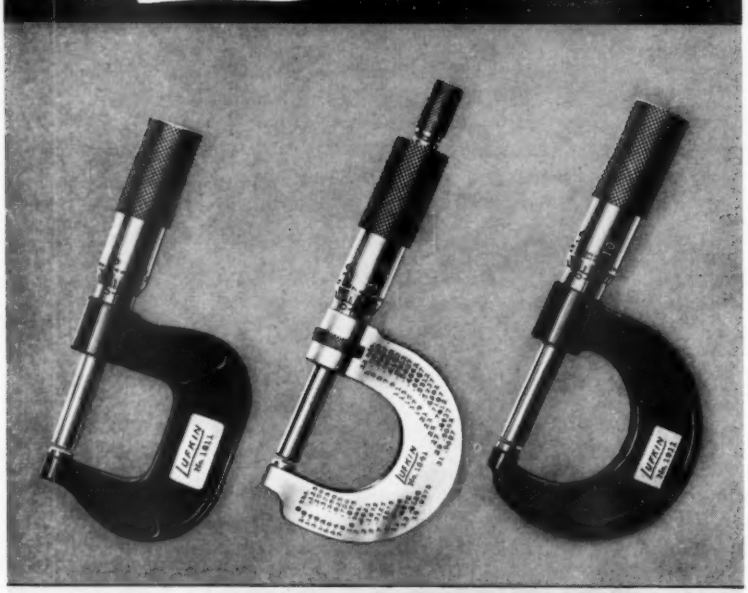
Strategic materials, such as manganese, tin, tungsten carbide, tantalum carbide, etc. are required in abundance for a successful ordnance manufacturing program. No campaign could be brought to a successful conclusion without a reserve supply.

The next Congress will be asked to authorize the purchase of manganese ore, pig tin, tungsten, etc. to store at suitable depots. This reserve is needed whether we have war or peace.

After Lieutenant Colonel Johnson had finished his formal address on ordnance production, he described in detail the construction of the automatic rifle, and answered questions from the audience relating to the rifle construction and to various points brought out in his address.

He closed his talk with the statement that Rockford's chief asset in the contemplated program was the ability to produce machine tools, and this would be its major requirement in case of emergency and Rockford would also be a big factor in the replacement of obsolete machinery in our arsenals.

GET LUFKIN FOR ACCURACY



THE BACKBONE OF INDUSTRY

Anyone can well imagine how far industry might have advanced without precision tools with which to produce articles on a large scale to exacting limits of accuracy.

Industry today demands precision more than ever before — and Lufkin Precision Tools meet this demand better than it has ever before been met. They are easier to use, last longer, and give even more dependable results. Mechanics and engineers everywhere use them with complete confidence. Write for Precision Tool Catalog 7.

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TAPES — RULES — PRECISION TOOLS

TOOL PIONEERS

(Continued from Page 15)

populations of civilized persons to live in comfort in an area which supported only a few thousands of red-men. The process in which we are engaged has, in fact, affected the population of the whole world. Professor Pearl of Johns Hopkins University has said that the population of the earth in 1920 was 4 times what it was when the Pilgrims landed on Plymouth Rock 300 years before. It is your work and the business organizations which has supported it that has made this great population possible. Should we cease to function, and should the business organization of which we are a part be permanently disorganized, a large part of this great population would be unable to exist. To put it more positively, millions would perish.

You and I have responsibilities both as Tool Engineers and as citizens to see to it that our tool-using civilization is maintained in good running order.

PROGRAM ANNOUNCED

(Continued from Page 22)

such as the above. On the other hand, just as many instances, though individualized, can be cited of men being displaced by machines of higher productivity.

"The crux of the problem seems to be whether it is advisable to have few men temporarily displaced with resultant gain to many, or whether we should consider the temporary displacement of these men as our most serious problem.

"However, the Fact Finding Committee of the American Society of Tool Engineers is out to find the facts and not theorize— and when it has found the facts to lay the findings before the public. That is what the Society and this Committee proposes to do."

The Modern BESLY VERTICAL SPINDLE GRINDER

No. 372—53" WET Besly Grinder

• This modern BESLY VERTICAL SPINDLE GRINDER recently installed by producers of air compressors—heating boilers—farm tractors—oil burners—ventilating fans—farm implements—steel foundry flasks—conduit fittings—etc., should reduce your manufacturing costs.

It embodies improvements that make it a real manufacturing tool. Can be operated wet or dry. Always equipped with famous Besly Titan Steelbac Abrasive Discs, the original bolted-on type disc grinding member. Built with grinding members 30" to 72" inclusive. Multiple Vee Belt Drive employing stock motor. • Ask for further details on this very popular type of Besly Grinder.

Write for your copy of Booklet on Besly Titan Steelbacs.

CHARLES H. BESLY AND COMPANY

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New Literature

of Interest to the Tool Engineer

The Dumore Company, Racine, Wisconsin, have issued a new 1939 Dumore catalog—a comprehensive and attractive piece of literature. The catalog commemorates "Over 25 years of progress" in the Dumore Company's history and is profusely illustrated with actual applications in the shop, showing the many and varied uses of the Dumore Grinders and many attachments. Many excellent photographs, tabular matter, specifications and diagrams are given.

▼ ▼ ▼

Ex-Cell-O Corporation, 1204 Oakman Blvd., Detroit, have recently completed an 8½" by 11" bulletin on The Ex-Cell-O Precision Facing Machine and the Ex-Cell-O Three-Way and Two-Way Precision Boring. Copies of these bulletins will be sent to interested readers of "The Tool Engineer" on request.

▼ ▼ ▼

"Grinding Wheels and Their Uses" by Johnson Heywood, which has just been published by The Penton Publishing Company, Penton Building, Cleveland, Ohio, sells for $3.00 a copy, postpaid. This book will be found enlightening to those seeking the latest information on grinding practices. Tool Engineers can turn to it for help on everyday grinding problems; grinding machine operators; or those who aim to take up this line of work can derive much benefit from the information presented. 23 chapters covering 367 pages present a large amount of information to which many hundred men have contributed their practical and theoretical knowledge as well as descriptions of various grinding practices and methods which they have found satisfactory.

Internal, cylindrical, surface, roll and cam, eccentric and other out-of-round surface grinding are treated in separate chapters. The author discusses the materials used for polishing and buffing and explains how to set up polishing wheels. Throughout the book he stresses ways in which grinding output can be stepped up and the required finish imparted at the lowest overall cost. Many -production-speeding and cost cutting methods and "kinks" are described. Figures are cited to prove how much the use of better methods has increased production and reduced costs.

▼ ▼ ▼

Danly Machine Specialties, Inc., Chicago (Cicero Branch P.O.), Illinois, recently issued a chart on drill and reamer sizes for dowel pins. This chart is easily read, attractively printed and has already been well received by the trade. Copies may be had on request by mentioning "The Tool Engineer."

▼ ▼ ▼

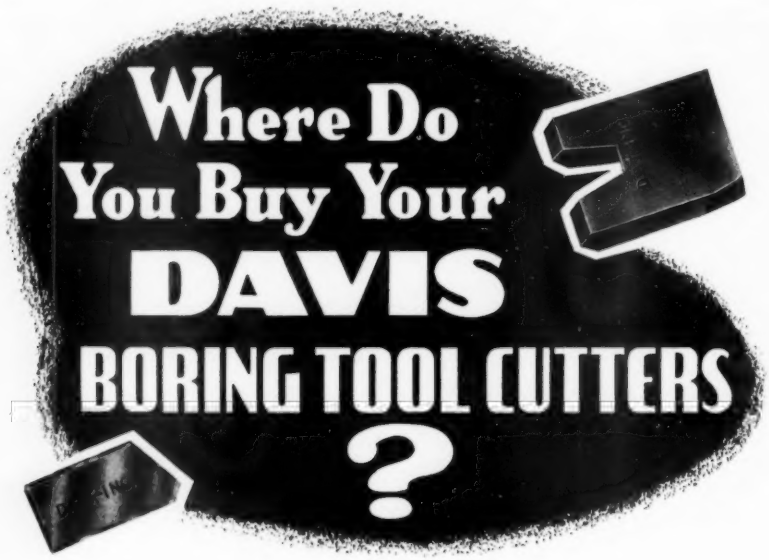
Two new catalogs have just been issued by the Landis Tool Company, Waynesboro, Pa. Catalog No. J-538 describes the Landis 14" Type C Hydraulic Universal Grinders, while Landis Catalog No. D-38 covers the 6" Type C Plain Hydraulic Grinders. Both of these catalogs are unusually complete in every way and contain a large number of typical set-up views.

Either of these attractive interesting catalogs may be secured upon request to "The Tool Engineer" or The Landis Tool Company.

▼ ▼ ▼

Chicago Wheel & Mfg. Company, 1109 West Monroe Street, Chicago, have issued a new catalog on "The Handee Tool of 1001 Uses." This very attractive pocket-size catalog carries a number of interesting features to the tool and die maker for it points the way to time and money savings on a great many jobs. For instance, the soft rubber polishing wheel has in a great measure eliminated the hand drudgery of finishing dies. The Handee Grinder & Polishing Kit shown in this catalog is very popular with die makers, it is said. Copies may be had free on request to "The Tool Engineer" or direct to Chicago Wheel & Mfg. Co.

(Continued on page 38)



If you need a pair of Davis Cutters, made of some special metal, such as Stellite, Tungsten Carbide, etc., it isn't necessary that you order direct from the manufacturer of that metal.

As the manufacturer will conscientiously tell you himself the best place to buy cutters for Davis Boring Tools is from the Davis Boring Tool Company. You'll get them just as cheap,—you'll get them correctly ground,—and most important of all, you'll be sure of a perfect fit.

Stellite Cutters, as well as Tungsten Carbide Tipped Cutters, in the more popular sizes, are carried in stock for immediate shipment.

For efficient operation of your Davis Boring Tools, buy your Cutters (in ANY metal you want) from the Davis Boring Tool Division, Larkin Packer Company, Inc., St. Louis, U.S.A.

Davis Cutters in Davis Boring Tools
Guarantee Absolute Satisfaction.

DAVIS BORING TOOLS

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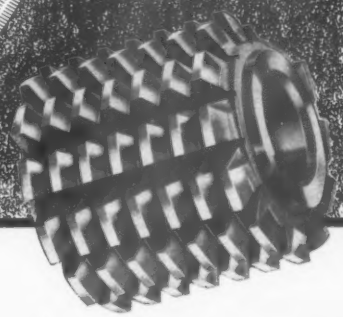

Here *is* Accuracy

It's a peculiar world now-a-days, in many respects a bewildered world. In other respects it's a business-as-usual world with many definite demands. One of these is a call for extreme accuracy in hobbing, especially gear hobbing. For extreme hobbing accuracy buy Barber-Colman Ground Hobs. No tools made for commercial service are more accurate, more finely finished, more economical in the long run. Pioneers in the field, Barber-Colman engineers developed original methods and special machines for finishing the form of hob-teeth by grinding on a most effective and economical basis. Every element of tooth form and helix is precise, can be duplicated exactly any time. To a world calling for extreme accuracy Barber-Colman offers Ground Hobs for utmost precision, greatest value in themselves; fine finish and economy in the work which they produce. Investigate. Consult Barber-Colman about Hobs and Hobbing.

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610 West Michigan St.

NEW LITERATURE

(Continued from page 36)

Federal Products Corporation, 1144 Eddy Street, Providence, R. I., have issued their new catalog No. 38 in which their new indicator improvements are shown in addition to their usual line of indicators and seven new gauges. The catalog contains 64 pages, profusely illustrated, describing the various gauges made by the company, types of dials available, special parts, "Comparators," bench gauges, a thickness gauge, a cylindrical test gauge, a small hole gauge, an internal and external comparator, depth gauges, thread lead testing gauge, thread pitch diameter gauge, etc. Address "The Tool Engineer" or the company direct for your copy.

▼ ▼ ▼

The 1939 Black & Decker catalog, now ready for distribution, features a complete line of Portable Electric Tools and accessories made by this company. The catalog comprises 56 pages, attractively displaying the Black & Decker line. Many new improvements in design and construction have been incorporated into many of the familiar units in the line and a number of new tools have been added. Particular attention is called to three new units making their appearance for the first time in this catalog—the new $\frac{3}{16}$" HORNET Drill is the smallest and lightest weight production drill ever offered on the American market, it is said. Also the new $\frac{1}{4}$" Ball Bearing Utility Drill and the new No. 36 Portable Electric Hammer. These three new tools, together with the HOLGUN and SCRUGUN and other tools announced during the year, give, it is said, the most complete and most up-to-date line that Black & Decker has ever offered. Address your requests to "The Tool Engineer" for complimentary copies.

Chicago Metal Hose Corporation, Maywood, Illinois, have issued a new catalog containing illustrations and engineering data on their Rex-Weld corrugated metal hose, Rex-Tube asbestos packed hose and other types, and couplings recommended for each type. Of special interest to the Tool Engineer is the wide range of sizes and long lengths of the Stainless Steel Bellows—also the combination straight section and bellows connectors which are now available in 18-8 stainless steel and described in this catalog. Also the Avioflex—with a cellulose element which is completely resistant to all hydrocarbons; and a flexing life practically unlimited. Also RW-89 Diesel exhaust hose, small bending radii for all sizes; bends made without heating. Get your free copy of this catalog by addressing your request to "The Tool Engineer."

▼ ▼ ▼

Hardinge Brothers, Inc., Elmira, N. Y. have issued a new bulletin, 8½" by 11", describing the Hardinge Precision Ball Bearing High Speed Tool-Room Lathe with dove-tail carriage and bed construction. The new bulletin is attractively printed, profusely illustrated with photographs and has numerous charts and detailed diagrams describing the new tool-room lathe "which is the result of 50 years experience in the manufacture of High Speed Tool Room Machinery."

▼ ▼ ▼

Logansport Machine, Inc., Logansport, Indiana, have issued bulletin No. 270 describing their new Heavy Duty Mill Type Cylinders. The "Logan" non-rotating double acting all steel air cylinders shown in this bulletin are furnished for extremely severe service. Many outstanding features are illustrated and described. Free copies may be had by addressing "The Tool Engineer' or the Logansport Machine, Inc.

▼ ▼ ▼

American Technical Society, publishers, Drexel Avenue at 58th Street, Chicago, are the publishers of a new book entitled Oxyacetylene Welding by Kehl which has just undergone thorough revision by Morgan H. Potter of the Dunwoody Industrial Institute. The book retails for $1.25. The new volume has been written in the popular "how-to-do-it" style. It is practical, clearly written, well illustrated, thoroughly indexed, and is bound in a durable binding.

▼ ▼ ▼

"Hacksaw-Ology" is the title of a new booklet of helpful hints on the care and use of Hack Saw blades. The various types of blades are illustrated and described. Several pages are filled with suggestions for the proper operation of Hack Saws for either hand or power machine use. This 6 by 9 inch educational booklet is mailed free on request to "The Tool Engineer" or the Simonds Saw and Steel Company, Fitchburg, Mass.

"These Drill Presses are Giving Me an Edge"

Manufacturers tell us that Delta Low-Cost Drill Presses give them a distinct edge on their competitors. Here's why: Delta Drill Presses cut labor costs, increase flexibility, save on special set-ups. They give you durable precision machines at a fraction of the cost of heavy machines. For instance: The unit here illustrated gives you

Many Special Features

Five speeds: 385, 600, 935, 1450, 2240 R.P.M. Floating Drive: Preloaded double-seal ball bearings: 16 tooth splined spindle: Table-Raising gear: Head-Raising gear: Tilting or production table: Completely enclosed belt: Safety spring wind: Foot power feed. Overall dimensions 66" high: 18" wide: 27" front to rear. Tilting table 11" by 12". Production table 12½" by 17" surface. Floor base 10" by 13¾" table surface. Shipping weight 340 lbs. Separate drill press heads available. Also high speed bench models and 2 spindle models. Send coupon for complete descriptive literature.

$89.50

With motor pulley and belt but without motor.

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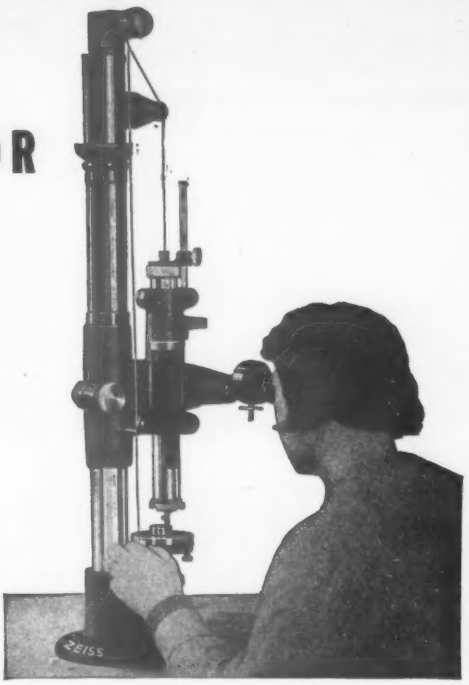

For *direct* measurement of lengths and diameters with a glass master scale and spiral microscope. Size is read immediately to .00005 in. without reference to gauge block combinations.

Catalog Fe 160 Upon Request

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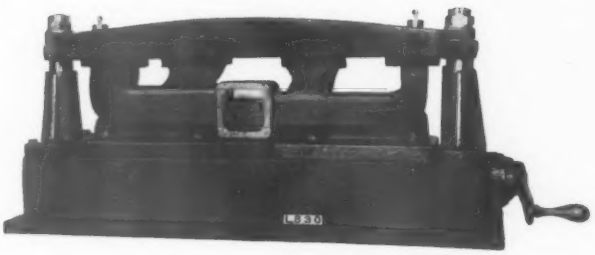

PROPOSAL L-830

Drilling flange holes in automobile motor manifold. The lower adapter is designed to support the four flanges and automatically compensate for the variations in castings. A Swartz lock holds the clamping action. The standard jig can be used again as tooling becomes obsolete.

STANDARD DRILL JIGS LOWER SUBSEQUENT TOOLING COSTS. THEY ARE NO MORE PERISHABLE THAN YOUR MACHINE TOOLS.

SWARTZ TOOL PRODUCTS CO., INC.

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Pittsburgh—J. W. Mull, Jr.
Toledo—J. W. Mull, Jr.
Philadelphia, Pa.—Morgan Tool & Equipment Co.

NEW *Equipment*

Stanley Contour Grinder

Stanley Electric Tool Division of the Stanley Works, New Britain, Conn., have announced the New Stanley Electric Contour Grinder No. 150. This new tool is designed for tool and die makers, and for use in mass manufacturing plants. The tool is particularly useful in finishing dies, gauges, templets and special shapes. It is equipped with a ⅜ H.P. universal motor operating at a speed of 18,000 R.P.M., has a work table 12" by 12" with an adjustable light fixture. This new grinder is very

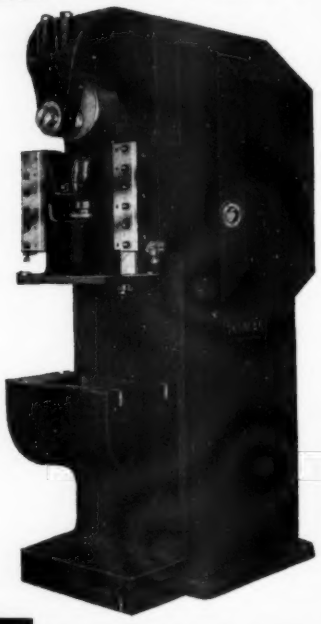
versatile, using various shaped mounted points, up to ½" shank, a great many grinding operations can be done with it. Price for the 110-volt machine is $69.50.

PUNCHES • SHEARS • SPACING TABLES

PRESSES • DIES • METAL-FORMING MACHINERY

BENDING AND STRAIGHTENING MACHINES • MULTIPLE DRILLS

If they're built by **THOMAS**



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designed and built this upright punch press to meet the exacting standards of one of America's largest automobile manufacturers.

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THOMAS
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Manufacturers of Thomas (the leading) Spacing Machines
PITTSBURGH, PA.

FABRICATING MACHINERY

Monarch 10" Precision Lathe

The Monarch Machine Tool Company of Sidney, Ohio, has introduced a new lathe "Reflecting the progressiveness of the machine tool industry." The new lathe is very modern in appearance—a 10", sensitive precision lathe newly designed. It incorporates several exclusive design points such as a 100 to 1 infinitely variable spindle speed range; feeds being automatically supplied through an endless web belt; and threads being chased through the regular end gearing to the quick change gear box. Drives from the spindle to the gear box are automatically selected. The new lathe makes extensive use of Meehanite Metal castings. It is provided with a one and one-half to two-horsepower motor providing a spindle operating feed of from 25 R.P.M. to 2500 R.P.M. Higher speeds may be furnished. The feeding rate is from .001 to .0075 inch, feeds ordinarily adequate for high speed turning, boring or facing. Feeds from .002 inch to .060 inch may be had through the quick change gear box. Fifty changes of threads and feeds are possible. Lead screw and feed rod are mounted on anti-friction bearings, the lead screw having a diameter of 1 inch, 8 pitch. In each twelve inches of length, lead error cannot be greater than .0005" permitting extremely accurate thread chasing. When writing for further details please mention "The Tool Engineer."

Rotary Lift Elevating Devices

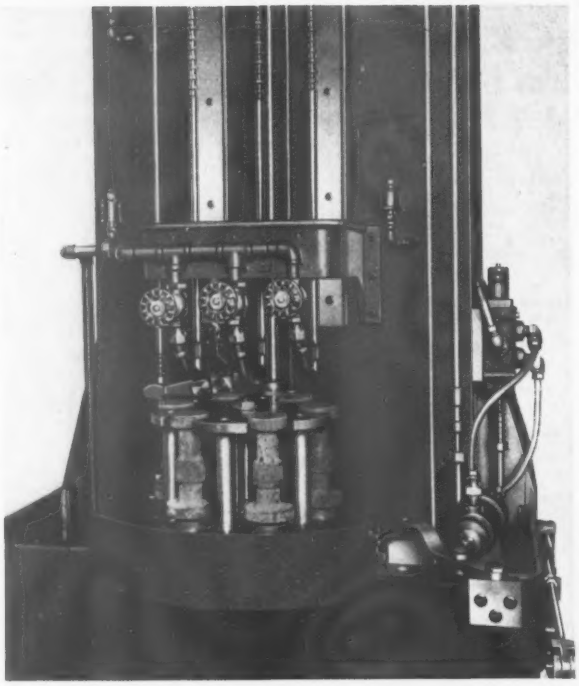
To meet a need in modern manufacturing plants for comparatively short rise (with a travel of 30 feet or less) elevating devices to handle materials between floors, eliminating existing ramps between different plant levels, to load into the back of trucks and freight cars and to eliminate the hand-feeding or awkward overhead crane feeding of heavy materials into presses, etc., are the claims made by the manufacturer, Rotary Lift Company of Memphis, Tenn., in announcing a complete line of equipment to serve these various purposes.

The Oildraulic Elevator (Oil Hydraulic) being pioneered by this company is really the old Water Hydraulic back on another cycle. By using oil as the fluid in the system the corrosive effect of water on steel is eliminated. Instead of using water from the city main to operate the elevator as in the case of many of the old water hydraulics, Rotary returns the oil in the system to a reservoir and uses it over and over again, pumping it into the system.

These units (usually with a travel of 5 feet or less(when in their lowered position form a part of the floor or loading platform. Ordinary traffic can be run over them, thereby saving considerable valuable space. Although the most popular equipment in the Rotary line is the Electric Oildraulic type em-

(Continued on page 47)

SEE YOU AT THE A. S. T. E. SHOW



Rotary Broaching Set-Up for Cluster Gears

Booth A-5

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DIES, JIGS, FIXTURES

AND

SPECIAL MACHINERY

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The Most Complete Line of "Standardized" Fixtures and Units, including—

ROTARY INDEX TABLES
MULTIPLE DRILL HEADS
ETC.

Q-C ENGINEERING PRODUCTS

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FOSTER

SMALL SCREW MACHINES

at the TAYLOR INSTRUMENT COMPANY

There are good reasons why this well-known manufacturer of accurate recording and controlling instruments uses Foster screw machines.

Here accuracy, flexibility, precision and production are of most importance.

Foster machines have features of productive value you should investigate before selecting your screw machine equipment.

FOSTER MACHINE COMPANY

ELKHART, INDIANA

LET US SHOW YOU

. . . in Your Own Shop—

On Your Own Work . . .

BOYAR-SCHULTZ PROFILE GRINDER NO 1

WE HAVE SHOWN many Tool and Die makers and Special Machine Shops how they can solve their contour grinding problems, do a better job, and save time with the BOYAR-SCHULTZ Profile Grinder No. 1. This Grinder is becoming one of the NECESSARY machine tools in the industry.

The BOYAR-SCHULTZ Profile Grinder is a TIME SAVER for Tool and Die Shops—and any other shops with work that requires grinding, lapping and fitting to close limits. It is light in weight—easily moved from job to job. Operated at approximately 20,000 R.P.M. Ideal for grinding and fitting irregular shapes, difficult contours for dies and punches, templates and cams.

WRITE US FOR COMPLETE DESCRIPTION AND DEMONSTRATION

Boyar-Schultz Corporation

2116 Walnut Street Chicago, Illinois

WATCH FOR US
Each Month

Self opening die-heads

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Collapsible Taps

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Tapping Machines

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Standard and Special automatic threading and tapping machines

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Other Tools to Specifications

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RICKERT - SHAFER
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CUT YOUR PRODUCTION TIME AND COSTS
WITH THE
MICRO Limit SWITCH

Special double throw single pole Micro Switch and actuating mechanism sealed in a compact metal housing and proof against normal oil and moisture. Precision built to give more than a million operations under severe conditions of high production machine tools. Available in right- or left-hand mounting, ⅜" conduit coupling optional. Write for specifications and recommendations covering LK Limit Switch applications.

1—Movement Differential 0.001" or less.
2—Pretravel of actuator plunger to operating point, 0.010".
3—Overtravel of actuator plunger beyond operating point 7/32".
4—Distance between operating point and C. L. of 3/16 dowel pin holes held to ±.002". Size 3¼" x 1 13/16" x 1".

TYPE LK

MICRO MS SWITCH
(Trade Mark)
CORPORATION
19 E. Spring St., Freeport, Ill., U.S.A.

CHAPTER DOINGS

(Continued from page 32)

men passed into the north ballroom and received another surprise. The menu had announced that ham would be served but the Faust Hotel really outdid itself. They made the ASTE a Christmas present of a turkey dinner instead. During the dinner Lt. Col. George S. Clark delivered a talk on "The Mechanics of Living in the Philippines" and explained the use of small tools and other equipment used there. During the recess after dinner, while everyone was visiting the exhibits, the ballroom was cleared of tables and refilled with chairs for the technical session. At 9:30 about 600 men reentered the ballroom to listen to Lt. Col. A. B. Johnson give a most interesting talk on "Government Regimentation of Industry in case of War." Following this talk he displayed an explained the new "Garland Semi-Automatic Rifle" which was recently tested and approved by the war department. No invitation was needed at this time to return to the exhibits and it was 11:30 when the last visitor left.

Hartford Chapter had a fine turnout on January 9th. This was a dinner meeting at the City Club and Bud Rainer's coffee talk on radio experiences with a sprinkling of original poems, was very interesting. L. N. Kohl, Republic Steel Company, delivered a splendid talk on Processing and Manufacturing parts made of Stainless Steel. The discussion

(Continued on page 43)

RACINE
VARIABLE VOLUME HYDRAULIC PUMPS

Tool Engineers and designers, you are offered a complete service for oil hydraulic systems. Variable volume pumps—Feed controls—Pressure regulators—manual and mechanical type valves. Let Racine assist you with your hydraulic problems.

Extremely quiet, smooth performance. A thoroughly proven efficient pump for pressures up to 1000 lbs. per square inch. Capacities 2000-4000-6000 cubic inches per minute. The Variable Volume feature saves horse - power. Delivers amount of oil actually required. Volume is controlled automatically or manually.

Write for catalog P-10

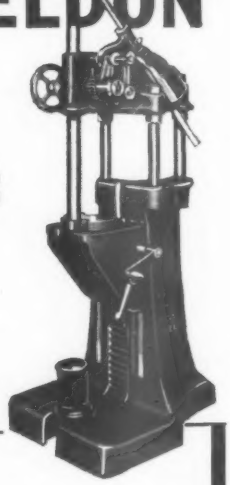
RACINE HYDRAULIC VALVES

A complete line—manual—pilot or electrically operated. Balanced pistons—accurately fitted. For oil-hydraulic installations.

Write for catalog V-10

RACINE TOOL AND MACHINE CO.
1777 STATE ST. RACINE, WIS.

SHELDON
Arbor Presses



In 12 Sizes, from ¾ to 12 ton Pressure Capacities

Catalog FREE

A complete line of bench and floor presses with improved designs, handier, more versatile and stronger size for size. Frames are semi-steel, Rams and Gears, alloy steel, heat treated and ground.

Machinery Dealers

Some territories still open.

Sheldon Machine Co. Inc.
3266 S. Cottage Grove Ave.
Chicago, U.S.A.

MODERN DIE-MAKING MACHINES

Here's Value!

GROB DIE-MAKING MACHINES

A MODERN DIE-FILING MACHINE and a DIE-SAWING MACHINE
Complete, ready to operate . . . Both for

$379.00

S-14 Price $192.40 Includes: Motor, Electric Brazer, Hand Grinder, Saw Blade, etc., ready to operate. Can also be furnished with an electric butt welder at slightly extra cost.

This is only one of many economical combinations of Grob Die-Making equipment. There are many more. Ask about them!

Over 300 Grob Machines in daily use in the Chicago territory alone, sold by Brett Machinery Company, Chicago, Illinois.

B-3 Price $186.60 Includes: Motor, Stand, 1 Flat File, etc., ready to operate.

GROB BROTHERS
GRAFTON, WISCONSIN

JARVIS

Multiple and Single

Speed Flexible Shaft Machines

are the choice of most craftsmen in metals, be it rotary filing, sanding, polishing, grinding, buffing on production or individual jobs, there is a Jarvis Flexible Shaft Machine and Rotary Tool available to meet your requirements.

Ask for our catalog MST.

THE CHAS. L. JARVIS COMPANY
Middletown, Conn.

CHAPTER DOINGS

(Continued from page 42)

which followed brought out numerous problems which confront manufacturers.

St. Louis had a bang up meeting at the Marquette Hotel on January 12th. This was a joint meeting with the ASME, ASM and the Tool Makers Club. The attendance was well over 300 and everyone was happy to greet visitors from Decatur, Springfield, Alton and East Alton. Charlie Staples did some shouting about ASTE aims and purposes. A. H. d'Arcambal must have been sick because he introduced C. V. Johnson, Small Tool Div. Pratt & Whitney Company, who was the guest speaker of the evening. His subject was devoted to gages and his illustrated talk was very well received. (Ed. note: d'Arc usually does the broadcasting. That's the reason for the conjecture that he must have been sick.) Chairman Doogan is to be complimented on the way he handles his job.

TOOL PIONEERS

(Continued from page 18)

been named and some examples of how the various types differ, one from the other, have been shown.

The ultimate conclusion to be drawn from the consideration of these examples is that back of a good tool there are three things: proper design, intelligent selection of material, and thorough heat treatment.

NEXT MONTH—

the March issue of "The Tool Engineer" will feature the American Society of Tool Engineers' Machine & Tool Progress Exhibition, which will be held at Convention Hall in Detroit, Michigan, March 14-18th. Be sure to keep your copy for future reference.

THE ORIGINAL

Etchograph

Electric Etcher

Thousands in use everywhere marking all kinds of tools, dies, gages and fixtures of any ferrous metals including the hardest alloys and carbides.

Three sizes to meet all requirements. Also a combined Etchograph and Demagnetizer.

Circulars and prices on request.

WM. BREWSTER MFG. CO.
50 CHURCH STREET
New York, N.Y.

THE M-B "HEAVY DUTY" AIR GRINDER

For a thousand and one tough hand jobs

Three ranges of speed, 25,000, 45,000 and 65,000 R.P.M.

Three stages of power with maximum rating of over ¼ H.P.

Streamlined designed for utmost ease of handling and control of air.

Adapter furnished for use in tool post of machine for internal jobs.

A **real** production tool.

Other models also, Air Line Filters and Automatic Air Line Lubricators.

Write for details.

M-B PRODUCTS

130 E. Larned St. Detroit, Mich.

PRODUCTION PERSPECTIVES

(Continued from Page 19)

ventories, and industrialists cannot buy until these heavy inventories have been decreased.

Pittsfield, Mass., employment in January continued its rising trend started in June and maintained in all but one of the six subsequent months. The June to December increase was 10%.

Preparations for extensive operations in the Springfield, Mass., Armory in the production of the Garand semi-automatic rifle are under way and a part of the program is the installation of a large amount of new machinery to fully equip the shops. The plant is now operating on the most extensive scale of any time since the World War.

Van Norman Machine Tool Company of Springfield, Mass., **is adding to its factory** space **and** also **new equipment with other machinery planned for installation** in the near future.

The Stacy Machine Works, Inc., Springfield, Mass., **had a lower level of business in 1938 than in 1937. A. Ashley Carroll,** Treasurer of the company, **stated that the lower level had been due to customers having less business and being unable to proceed with the building of new machines and new processes.** Through the purchase of new equipment, **however, he feels that his company could supply manufacturers with considerable better service than before and was enthusiastic about the future** and **looked forward to a prosperous 1939. Metal Saw and Machine Company,** of the same city, officials **are inclined to feel optimistic for 1939. Smith & Wesson, Chicopee, Mass., reports business during 1938 distinctly better than during 1937,** both as to domestic and export business **and "expect both to improve in 1939 and have good prospects for domestic business as well as good ones for export to all parts of the world."**

The **Westinghouse** Electric and Manufacturing Company, **Springfield, Mass.** largest employer **has been building up its pay roll steadily through the recalling of help during the last two months so that it now stands at 2,200 with prospects for another increase.**

▼ ▼ ▼

George R. Meyercord, Chicago, head of the Haskelite Company stated in Washington before a special army board studying the possibility of using plastics in plane construction that his company had **already produced plastic fusilages and wings** for eight or ten planes, which have flown for more than a year. Dr. Bakeland, a witness before a Senate Monopoly Committee indicated that such commercial production was near at hand.

E. E. LeVan was **recently made Vice-President in Charge of Sales for** the **Haynes Stellite Division** of the Union Carbide and Carbon Company, of Kokomo, Indiana.

GAMMONS OF *Manchester*

PRODUCTION TOOLS

ORIGINATORS AND MANUFACTURERS OF HELICAL FLUTED TAPER PIN REAMERS

THE GAMMONS-HOLMAN CO., MANCHESTER, CONNECTICUT

DO-ALL CUTS COSTS

at Doehler Die Casting Co., Pottstown, Pa.

Usual Time, formerly drilled and milled, 80 hrs.
DoAll Contour Sawing ..... 26 "

Saving ..... 54 "

Plus saving end mills, drills and machine released for other jobs.

Accepted Method

Contour Sawing is a new process of machining which eliminates drilling a row of holes, to cut out any internal or external shape. The DoAll cuts any metal or material (up to 10" thick) rapidly and smoothly. The narrow saws are inexpensive.

FREE New Hand Book on Contour Machining 100 pages of valuable metal working helps.

The Modernizing Machine Tool

The DoAll does the same class of work as a shaper, milling machine and tool room lathe. DoAll is a rugged precision tool that sells for 1/3 the price of any one of the machines mentioned above, and replaces them all. Users say it is the busiest machine in the shop.

DoAlls are used in quantities in large and small plants in 23 countries, and by such well-known firms as Ford, Fisher Body, Cadillac, Baldwin Locomotive, Douglas Aircraft, U. S. Navy, International Harvester, General Electric, Westinghouse, Ace Tool & Die, Glenn L. Martin, etc.

Let a factory-trained man bring a DoAll to your plant and show you what it does, what it saves on your own work.

TE-2

☐ Send data and special prices on the DoAll

☐ **Send Free Hand Book**

Name .....

Address .....

Continental Machines, Inc.
1304 S. Washington Ave., Minneapolis, Minn.

USE OK INSERTED-BIT TOOLS

ADDED SPEED — ECONOMY FLEXIBILITY!

OK Inserted-Bit Metal Cutting Tools answer the most exacting shop needs, promoting speed and economy. They may be had in all standard multiple blade and single-point types.

The single-point tools, such as are shown here, are offered in various locking designs. In the Series 2000, the bits are held in mating serrations; in the Series O-200, round-shank bits are locked in a drop seat. The bits may be had in hundreds of standard and special grindings.

In OK Tools, the bodies are of chrome nickel steel, forged and heat treated for maximum strength. The bits are of high speed steel, Stellite, Super-Cobalt steel, and with carbide tips. Literature and estimates on request. Please explain fully your shop set-up and the work you do.

A LARGE AND VARIED LINE IS ALWAYS AVAILABLE

PRODUCTS OF THE OK TOOL COMPANY, SHELTON, CONN., U.S.A.

TRADE OK MARK

INSERTED-BLADE METAL CUTTING

TOOL SYSTEM

HIGH SPEED

and Synchronization

This machine drills 10,800 holes in 600 pistons per hour

The machine shown above is typical of the extremely high speed of operation and synchronization in Bradford equipment. A new electrical circuit in conjunction with a magnetically actuated index mechanism which indexes the piston in one-half second, synchronization of all movements of the machine by electrical interlocks throughout are some of the unusual features.

WRITE FOR DESCRIPTIVE LITERATURE ON THIS AND OTHER UNUSUAL BRADFORD EQUIPMENT

THE BRADFORD MACHINE TOOL COMPANY

Cincinnati (Established 1840) **Ohio**

Dealers Wanted for Some Territories

HANDEE TOOL OF 1001 USES

THE TOOL EVERY INDUSTRY NEEDS

Consider its superior features; then list the many places in your plant where the Handee will save money and speed up work—on the production line, in tool room or experimental laboratory, to handle all sorts of jobs from delicate carving and intricate grinding to constant service on regular work. Special **custom-built**, air-cooled motor develops 25,000 r.p.m.—plenty of speed for any operation. Ball-bearing construction insures vibrationless performance. 7-segment commutator. Weighs only 12 oz. and fits the hand comfortably. Your choice of 300 fine accessories for every kind of work.

Join the rapidly growing list of great and small industries who are solving production problems with the Handee. Only $18.50 postpaid with 6 accessories.

NEW 64-PAGE CATALOG

Information on all Handee Products, including largest assortment of accessories ever presented.

Hardware Dealers and Mill Supply Houses carry Handee. Order through them or direct on 10-Days Trial.

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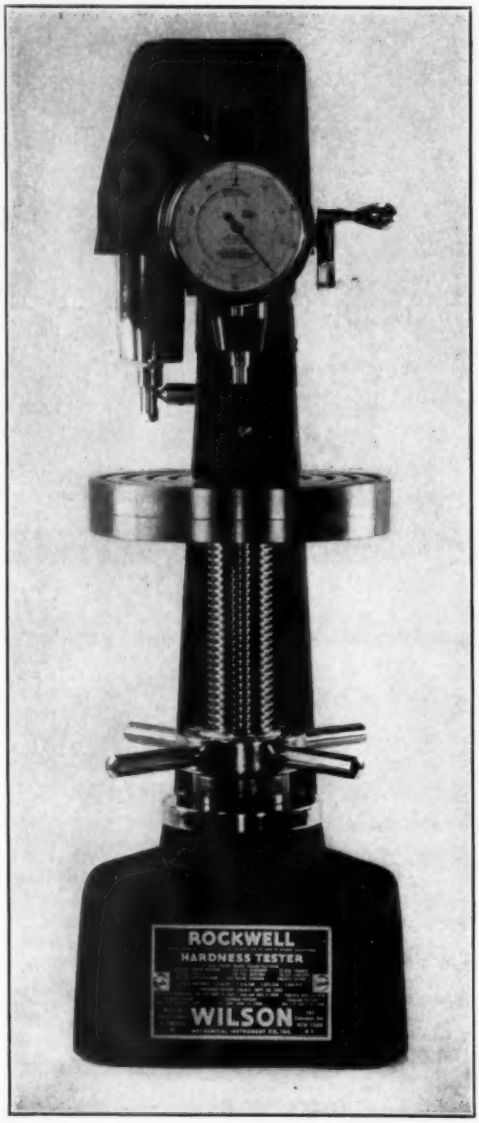
TRADE MARK REG. U. S. PATENT OFFICE
HARDNESS TESTER



Large and small tool-making shops, the world over, have found these instruments essential. They use them because they are truly precision measuring tools. They are accurate because we know the scores of necessary steps to take to build them the way we do.

WILSON
MECHANICAL INSTRUMENT CO., INC.
380 Concord Avenue New York

Only Wilson Makes "ROCKWELL" Testers

GOVRO-NELSON
AUTOMATIC DRILLING UNIT

FAST—COMPACT—CENTRIFUGAL FEED PROTECTS DRILLS—EASILY ATTACHED

Four models—1800 and 3600 synchronous and 5500—12000 R.P.M. Universal Motors.

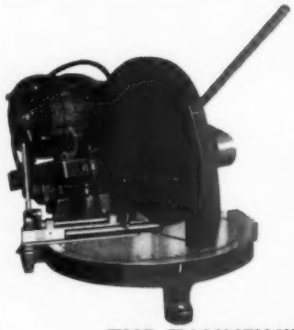
HOLE ENGINEERING SERVICE
307 Stormfeltz Loveley Bldg., Detroit, Mich.

Two New **IMPROVEMENTS**

THAT MAKE UNIVERSAL DRILL BUSHINGS A BETTER BUY THAN EVER

The exceptional wearing qualities of the combined carbon and nitrogen case — is further improved by honing the bore to a Superfinish. The black dome head is a distinctive Universal feature. Write for data TODAY

UNIVERSAL ENGINEERING CO.
FRANKENMUTH, MICHIGAN



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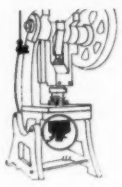
ABRASIVE CUT-OFF AND MITER MACHINE

For Bench Use

Instantly cuts any angle from 45° R. to 45° L., bars, tubing or moulding, obtaining a clean ground finish on hard or soft metal. Just the machine for the tool room. Saves Toolmaker's Time. Prices right. Six sizes. Send for Literature.

THE TANNEWITZ WORKS
GRAND RAPIDS, MICHIGAN



Universal Die Cushions for deep drawing, forming die, pressure pad control, and blanking die stripper actions.

Write for engineering power press die booklet.

DAYTON ROGERS MFG. CO.
Minneapolis, Minn.

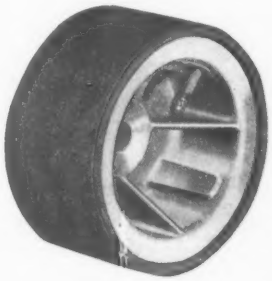
NEW EQUIPMENT

(Continued from page 40)

ploying an electric pumping mechanism, air operation is also satisfactory for certain applications. "Levelators" and "Tabelators," the trade names given these devices, are manufactured and sold by the Rotary Lift Company, Memphis, Tenn. Mention "The Tool Engineer" when inquiring for further details.

"Mall" Pneumatic Sanding Drum

Mall Tool Company, 7740 South Chicago Avenue, Chicago, Illinois, announces an improved pneumatic sanding drum. The improvements include a new style fabric band and air tube. The construction of the drum itself has been improved in design and simplified for faster renewal of abrasive bands and easier servicing.



This new improved pneumatic sanding drum has wide use in metal working industries since it produces a smooth draw file finish on all metals and materials. It may also be used on allmakes of flexible shaft machines, bench and aerial grinders. It is designed for continuous hard usage on all sanding operations. A very smooth polished surface is obtainable by the soft air cushion which holds the abrasive firmly in place, is claimed. The action of this air cushioned, metal finishing wheel is exactly the same as the action of a balloon tire; the soft cushion eliminates all chatter, and gives a clean, even cutting action. For further details, mention "The Tool Engineer."

"Super" Diamonds

Not synthetic but a real diamond, a stone for commercial use said to be actually superior in hardness and toughness to the finest, most expensive of nature's diamonds, are now being made by a secret process and are obtainable from the Super Tool Company, 21653 Hoover Road, Detroit, Michigan, in their product known as the Super Cardimond Wheel Dressing Tool.

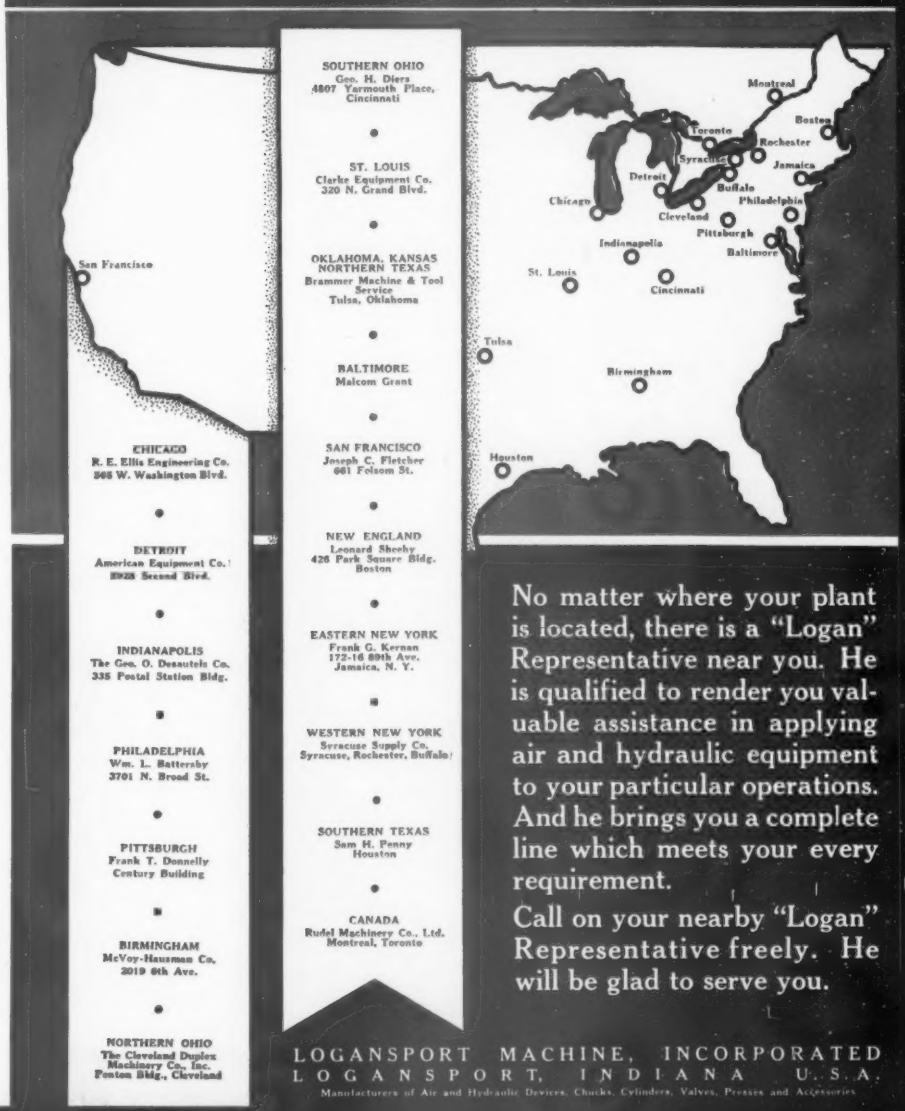
These new diamonds are somewhat lower in price than the natural stones of good quality, and are a great deal more economical to use, it is claimed, due to their extremely irregular grain structure which is traceable to the grain of the very small diamonds from which they are made. This creates, it is said, a stone that the diamond cutter cannot cut, and one that shows a minimum of wear per dressing, as well as a vastly greater resistance to breakage, on account of the absence of cleavage lines in the stone. They are processed in sizes from approximately one and one-half karats up, and come in shapes similar to those of natural stones. There is only one grade or quality, so the buyer, the manufacturer claims, has no need for special training in the selection of these diamonds and can buy them without fear of variation in quality.

An example of the efficiency of this new product is cited in the dressing of wheels in centerless grinders. This diamond, it is claimed, will dress the widest and hardest type of wheels without loss of size and the resultant taper in the face of the wheel. Mention "The Tool Engineer" when securing further information.

Improvements in "Universal" Bushings

The Universal Engineering Company of Frankenmuth, Michigan, has recently announced two new improvements in their line of Drill Bushings. The bore is now honed to a super-finish which further improves the wearing qualities of the combined carbon and nitrogen case. This super-finish bore also tends to give greater accuracy for round and straight holes, it is said. The other development announced by Universal is the new Black Dome process—a treatment which gives the bushing head a jet black appearance. It is claimed that this process reduces galling when lubrication is not present. Literature describing these two new improvements may be procured upon request to the manufacturer, mentioning "The Tool Engineer."

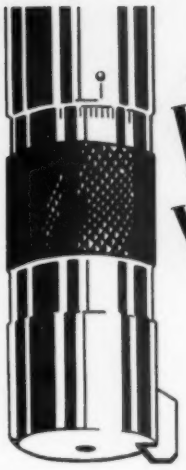
THERE'S A "LOGAN" REPRESENTATIVE NEAR YOU



No matter where your plant is located, there is a "Logan" Representative near you. He is qualified to render you valuable assistance in applying air and hydraulic equipment to your particular operations. And he brings you a complete line which meets your every requirement.

Call on your nearby "Logan" Representative freely. He will be glad to serve you.

LOGANSPORT MACHINE, INCORPORATED
LOGANSPORT, INDIANA U.S.A.
Manufacturers of Air and Hydraulic Devices, Chucks, Cylinders, Valves, Presses and Accessories



HERE'S A *Real* WORK HORSE

PUT A BIT IN HIS MOUTH

Rugged, yet quickly adjustable for precision boring to limitless dimensions, .7500" and up. Write for MIKRO-LOK catolog No. 40.

"—adjusts like a micrometer"

ECLIPSE COUNTERBORE CO.
DETROIT, MICHIGAN.

A LOOK TELLS A LOT!

From your very first look at The Haskins Tapper you can tell it was built to do an altogether different kind of tapping job —**and to keep on doing it!** And the more complete your examination, the more you understand why this machine is setting new standards of speed, precision and endurance in hundreds of plants. There's no cost or obligation involved in taking a good look at The Haskins Tapper in the light of **your own** production problems—any time you're ready!

A FREE BOOKLET—"Precision Tapping at High Speed"—tells the whole story. Write for it. R. G. Haskins Company, 2756 W. Flournoy Street, Chicago.

HASKINS PRECISION *Tapping Equipment*

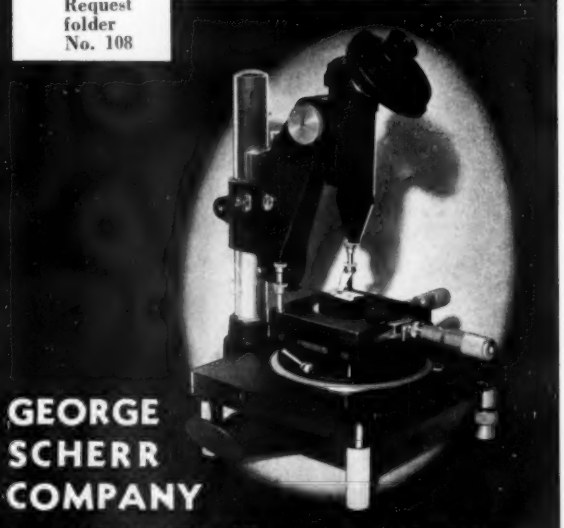
MICROSCOPIC ACCURACY

on threads, forming tools, dies, templets etc.

AT A PRICE WHICH ANY SHOP CAN AFFORD WITH

THE LEITZ SIMPLIFIED TOOLMAKER'S MICROSCOPE

Request folder No. 108



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128 LAFAYETTE ST. NEW YORK

SALES MANAGER

of proven ability and with excellent clientele in the middle west, desires immediate connection with Machine Tool Builder, or Perishable Machine Tool Manufacturer. 15 years as Mechanical Engineer and 8 years selling experience, best of references.

Box 509, The Tool Engineer

Competent Sales REPRESENTATIVE

is desirous of obtaining sales rights on perishable machine tools or production parts. Can furnish representation for state of Michigan, excellent clientele, 20 years connection automotive industry, 7 years selling experience, excellent references if required.

BOX 505. THE TOOL ENGINEER

FEDERAL

CUSHIONED MOVEMENT DIAL INDICATOR

SHARP BLOWS--are cushioned before the impact reaches the movement in this Indicator.

For most applications the normal construction of a Federal Indicator has more than sufficient strength. However, there are occasions when it is necessary to apply an Indicator where it will be subjected to sudden and heavy blows, or to rough treatment in the hands of unskilled workmen. For such cases specify a cushioned movement indicator.

FEDERAL PRODUCTS CORP., 1144 EDDY ST., PROVIDENCE, R. I.

PRECISION MEASURING INSTRUMENTS

Chicago • Cleveland • Detroit • Hartford • Muncie
New York • Philadelphia • Pittsburgh • Rochester

GRIND 'TIL IT'S USED UP

INSERT A NEW CENTER

Like the lead in your mechanical pencil, Eclipse insert Centers are interchangeable and adjustable for length—resist burning and roughing . . . . Inserts standard in HSS, available in Stellite. Write for Eclipse catalog.

ECLIPSE COUNTERBORE CO.
DETROIT, MICHIGAN

YOU'LL SAVE TIME

AND TROUBLE . . . BY SPECIFYING NATIONAL TWIST DRILLS, HOBS, REAMERS . . . MILLING CUTTERS, *Special* TOOLS

NATIONAL TWIST DRILL AND TOOL CO.
DETROIT, U. S. A.

Tap and Die Division, WINTER BROS. CO., Wrentham, Mass.
Factory Branches: New York, Chicago, Philadelphia, Cleveland
Distributors in Principal Cities

***Universal* COLLET CHUCK**

FOR SINGLE-PURPOSE DRILLING

In the Universal Collet Chuck the drill is instantly adjustable in a longitudinal direction and the grip on either the drill flutes or shank is equally secure.

UNIVERSAL ENGINEERING CO.
FRANKENMUTH, MICHIGAN

ARMSTRONG

***The Answer to Most Tough Machining Problems Is the Right* ARMSTRONG TOOL HOLDER**

No matter what your machining problems, if it's on lathes, planers, slotters or shapers, it has been worked out for you in the Armstrong System of Tool Holders. Today the "System" includes ARMSTRONG TOOL HOLDERS of over 100 sizes and shapes including new "Spring" tool holders that end the "problems" of cutting-off and of threading the new tough alloy steels, and "carbide" tool holders that take carbide tipped cutters and machine hard steels, stainless steels and soft brasses economically.

If you have machining "problems" check your tool problem . . . the right ARMSTRONG TOOL HOLDER will handle its job efficiently for it will be correctly designed, correct in proportion, in cutting angle, approach, and, will permit maximum clearance all around. It will be strong beyond any need, will stand up for years of continuous service at any speed or cut the machine tool can attain. It will do the work of a complete set of forged tools and will "Save All Forging, 70% Grinding and 90% High Speed Steel" on every job.

Check your "problems" against the ARMSTRONG Catalog.

Buy ARMSTRONG TOOLS from your Supply House

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
360 N. FRANCISCO AVE. CHICAGO, U.S.A.
New York Office: 199 Lafayette St., New York
San Francisco London

ACME Standardized Drill Jig Bushings

Plain Stationary Press Fit—Type "P"

Shouldered Stationary Press Fit—Type "S"

Removable Slip—Type "R"

Prompt delivery from stock on over 10,900 standard items—over 6700 ACME Standard—over 4200 A. S. A. Standard—all completely finished ready for use. *Special sizes made to order.*

Made in our new plant by the most exacting and scientific methods—insuring accurate fit plus long wear—concentric within .0003" full indicator reading.

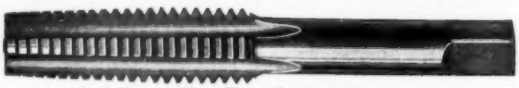
Send for bulletin containing complete data and low prices. Satisfactory service guaranteed.

Also manufacturers of complete machine parts, specializing in **hardened and ground** parts requiring **extremely close limits, lapped fits, etc;** also **hydraulic appliances** for pressures up to 20,000 lbs. per square inch.

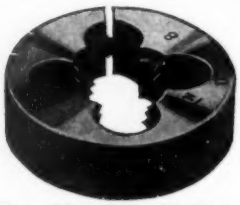
ACME INDUSTRIAL CO. 208 N. LAFLIN ST. CHICAGO, ILL.

Victor's Bargains in

LEFT HAND TAPS AND DIES



Left hand Plug Taps $.75 each any size



Left Hand Dies, 1½" O.D., $1.50 each any size

Size Inches	N. C. Threads	N. F. Threads
1/4	20	28
5/16	18	24
3/8	16	24
7/16	14	20
1/2	13	20
9/16	12	18
5/8	11	18
3/4	10	16

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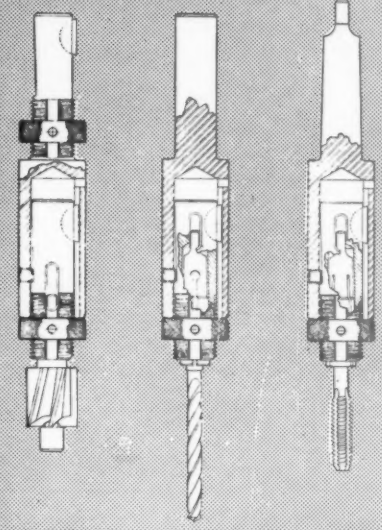

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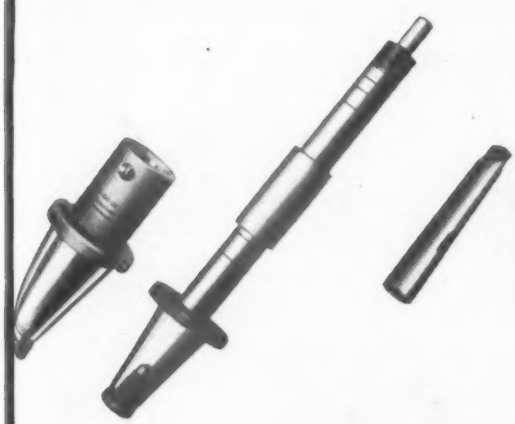

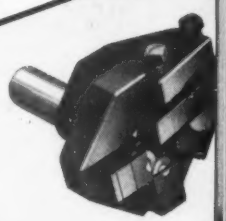

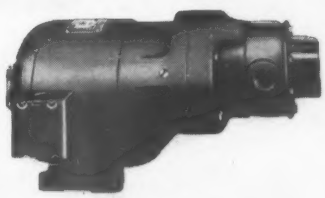

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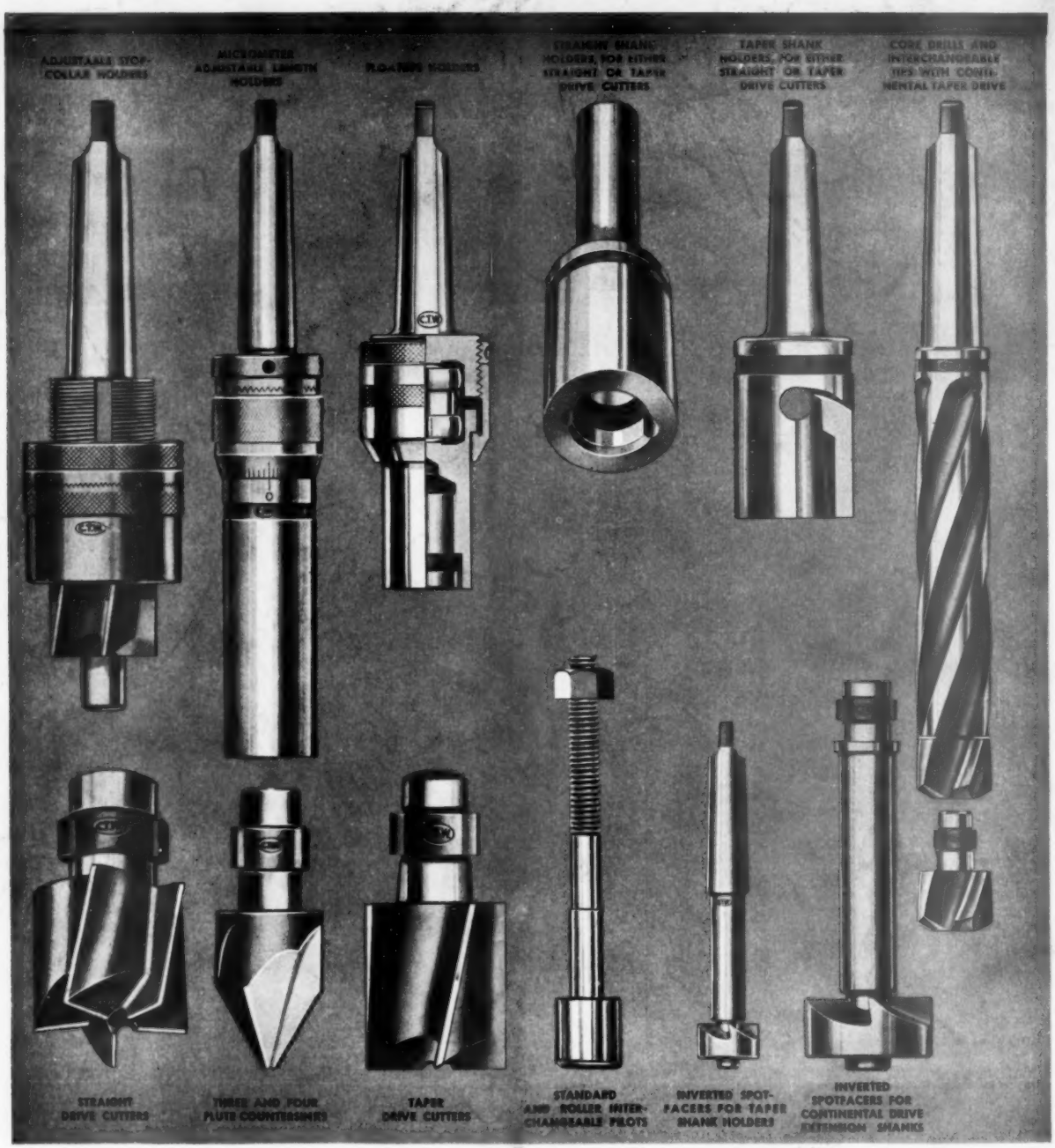
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